WHAT SHALL I EAT?

DR. F. X. GOURAUD

AUTHORIZED TRANSLATION
BY
FRANCIS J. REBMAN

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A MANUAL OF RATIONAL FEEDING

BY

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With a Preface by PROF. ARMAND GAUTIER, of Paris

ONLY AUTHORIZED TRANSLATION INTO THE ENGLISH LANGUAGE

BY

FRANCIS J. REBMAN

WITH A GLOSSARY CONTAINING DEFINITIONS OF THE PRINCIPAL TECHNICAL TERMS, AND AN INDEX OF DISEASES REFERRED TO IN THE TEXT

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TRANSLATOR'S PREFACE

In reading this book in the vernacular, I was struck by the practical manner in which the author deals with the subject before him, and I considered it advisable to present his views to the English-speaking public. The style is facile, succinct, and very readable. He gives an impartial survey of the burning questions of the day and, by advancing the arguments of opposing authorities, leaves it to the reader to arrive at his own conclusions. Read the book and you will understand what I mean to convey.

His opinions on the questions of alcohol, white bread, and vegetarianism are interesting and worth studying, as they strike a keynote on the discussion of these important factors of modern diet.

The striking feature of the book lies in its arrangement. The author gives for each article of food mentioned in the book the actions on the digestive functions, on assimilation, secretion, and elimination. This is important. He

likewise gives the reasons why a food should be employed or rejected, according to the normal or pathological conditions of each individual case. Indications and contraindications are given in every instance, which makes the choice of food adapted to each case easy.

The book deserves a place on the five-foot shelf of every medical man—in fact of every thinking, intelligent person in the land, who takes an interest in the hygiene of the kitchen, the proper choice of food for the table, and a rational care of the body.

The business man will derive benefit from its perusal; the educated housewife will find in it many hints that enhance the management of the kitchen; and the afflicted as well as the convalescent will be encouraged to turn to its pages with profit and satisfaction.

For the better understanding of the technical terms employed, I have added, at the end of the book, a glossary containing definitions of the most important medical and scientific expressions used in the text. This glossary does not appear in the original edition.

F. J. Rebman.

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PREFACE

People generally—alas, too often—follow old-fashioned and stereotyped rules in their daily diet, such as: "When hungry, eat." "What is eaten with relish, does no harm." "When the stomach calls, everything tastes good." Many believe that every one should follow his own tastes and inclinations and should loyally adhere to personal predilections and to the habits formed in early life. But are not these habits due rather to circumstances, i.e., influences—good or evil—that surround us? Likewise to prevailing fashions, local customs, to current ideas and to individual caprices and prejudices, etc., i.e., conditions which are calculated to create artificial wants that often enough entail threatening and dangerous symptoms? Not unlike to the opium-smoker, does the heavy meat-eater, for instance, experience that feeling of ungratified appetite, as though something were still wanting, when he cannot get his favorite food to *excess*.

This peculiar illusion is strangely and strongly marked in cases of morphinism, of alcoholism, and of nicotinism. It is an error into which the happy man is apt to fall who thinks that he is doing the right thing when, with a copious and succulent meal, he appeases a merely imaginary craving. The same mistake is made by the working man who drinks for the avowed purpose of bracing himself up for his task, or to make up for underfeeding, but who does not drink simply for the sake of the pleasure and bodily gratification derived from the beverage.

Yet there must of necessity be certain laws, rules, or regulations by which our diet is to be governed. The food question is paramount in man's life; his very existence depends on it. It has engaged the serious attention of physiologists, eminent physicians, chemists, sociologists, and even moralists. In recent years the followers of Atwater have taken up this study, and have demonstrated the social and hygienic advantages that accrue from feeding the masses properly. They also point out the necessity for teaching those who depend for their living on the work of their hands, how to feed and how to procure, at the smallest possible outlay, the

food best adapted to their physical needs. The medical profession is nowadays well equipped, by personal study and observation as well as by the aid of researches made by able and clever chemists, to understand and regulate the question of alimentation, in the sick-room particularly, with judgment and precision. Many excellent books have been written on the subject, and much good has been achieved by the dissemination of this wholesome literature.

Touching on this point leads me to refer here particularly to Dr. Gouraud's new book. Dr. Gouraud was formerly the chief of the laboratory of the Medical Faculty of Paris, and also the intern of several hospitals. In both capacities he earned well-deserved distinction. His book is clear, succinct, and practical. He tells everything that is of importance and all that is essential for a medical man to know. The author quotes for each article of food—meat, milk, eggs, bread, pulse, wine, etc.—the reactions produced on the digestive functions, on assimilation, on the secretions, and on the apparatus of elimination. He also enumerates the reasons for the employment or rejection of each food according to the constitution and the state

of health of the individual. This is an ingenious form of presenting the subject, for it allows of determining at once what alimentary substances may be permitted to enter into any given diet or regimen, and clearly points out the indications and contraindications for their employment.

It gives me pleasure to recommend, in strong terms of approval, this book to the medical reader, for it is preeminently practical and cleverly conceived. I know of no better guide.

ARMAND GAUTIER.

PARIS, FRANCE.

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WHAT SHALL I EAT?

INTRODUCTION

Life, by its chemicophysical actions, produces throughout the whole organism an incessant flow of cellular changes. The living cell uses itself up, as it were, and incessantly casts off certain elements which are not in consonance with its proper functions, deriving its heat and energy from the combustion of organic matter that reaches it in the ordinary way and through the proper channels. Wear and tear and combustion is the never-ending process of decomposition, or catabolism, which must of necessity be compensated by a parallel process, or, in other words, by corresponding acts of assimilation, i.e., metabolism. Thus life is determined by a double action, i.e., absorption and decomposition. The organic equilibrium or balance is established by the proportion that exists between the two.

Alimentation renders assimilation possible by adducing the requisite material in an appropriate form. Every substance which the organism

is able to assimilate is food, no matter whether it is used for the purpose of reconstituting the wasted tissues, or to recover the losses in calories. If we adopt this general definition, then oxygen is food—in fact, the most important food of all. But in general practice the term "food" is applied only to those substances which pass by ingestion through the alimentary canal.

Food is, therefore, the condition of life of the organism, but becomes a harmful element when it departs from its physiological functions.

In former days the opinion prevailed that food might either act as an aid or as a foe in every disease. Modern science, however, claims that food has an enormous influence on the well-being of the human race in general as well as on the individual; that the origin of many morbid conditions can be traced to a faulty regimen, and that rational feeding is the fundamental condition of our physical health.

In primitive times the physiological instinct inherent in man served as a guide in the choice of quality as well as quantity of food. This has changed but little in our days. Individual greediness, encouraged by a culinary art at once complicated and ill-advised, and the exigencies

of modern life which force upon man the immoderate use of alcoholic and other stimulating substances, undoubtedly lead to an anti-hygienic, irritating, and too copious employment of food. At the same time the unrestricted influx of population into large cities and the difficulties encountered in provisioning the same, largely affect the food question, often enough indeed to the extent of downright wickedness and knavery.

Against these evil tendencies—becoming more pronounced every day—a certain current of reaction has set in with the avowed purpose of providing a pure food supply based upon the rational principles of physiology. This movement might be summed up in the following axiom: "*Rational feeding must, while pleasing to the palate, maintain the physical balance, equip the organs with comfort, and reduce to a minimum the fatigue engendered by its ingestion.*"

In order to establish a proper basis in this connection, it is primarily necessary to fully understand the two conditions by which the physical balance is maintained, i.e., fixed principles or the material for up-building, and calories or material for combustion. It is easy to determine the former, because the renal, intestinal,

pulmonary, and cutaneous eliminations establish their limits. We mention, first of all, water, of which we excrete more than 2,400 cubic centimeters per day. Then there is nitrogen, which, either under the form of urea, or of purins, or amino acids, amounts to about 15 grams (an equivalent of about 100 grams of albumin). Finally, we must consider the inorganic substances, viz.: salt (sodium chlorid), 11 to 12 grams; phosphates, 4 to 5 grams, allied either with alkaline or earthy basic substances; sulphates, 3 to 4 grams; carbonates or bodies, such as lime, 0.50 gram; magnesium, 0.20 centigram; soda, 1.50 grams; potash, 0.40 centigram; iron, 0.02 to 0.04 centigram; and a whole series of other substances present perhaps in negligible quantities only, yet, nevertheless of appreciable physiological importance; we quote iodid, arsenic, manganese, fluorin, bromin, etc.

The daily percentage of water and nitrogen is nearly always sufficiently large. Nitrogen, indeed, is believed to sin by excess rather than by default. The mineral bodies are never present to the same extent. We shall, therefore, exercise particular care in giving the mineral value of each food mentioned. As for the rarer bod-

ies, such as iodid, arsenic, and manganese, they are found only in a small number of foodstuffs, chiefly in vegetables. In order to obtain them it is necessary to change the diet constantly.

It is much more difficult to calculate the requirements of energy, of the calories. It entails untold labor, though at the present hour the question seems to have been pretty definitely settled. Pettenkofer and Voit made a series of very successful experiments with men in prime condition; A. Gautier calculated the amount of food consumed in Paris from 1890 to 1899; Atwater figured out, in his calorimetric laboratories, the number of calories emitted in twenty-four hours by a man in a state of perfect health. The results obtained in all these instances were approximately the same and allow of the following conclusion:

The mean ratio in the adult in a moderate climate is thirty-eight calories per kilogram per day.

For several years Drs. Pascault, Fauvel, and Labbé have demonstrated that even a notably smaller ratio is quite compatible with even a very active life. It seems to us, however, that these statements, although they are interesting

from the standpoint of pathology and in cases in which a restriction of diet is indicated, for instance in arthritis, are not applicable in the domain of physiology or to normal health. We feel rather inclined to modify the axiom quoted above and put it in this way:

We can, if needs be and the interests of health so require it, decrease the mean ratio to thirty calories—and even below this—per kilogram per day, so long as this is done under the careful surveillance of a physician.

Of course this law of ratio is modified by many circumstances. It is too low for heavy weights and men of big stature, and vice versa.

That it is too high for children under fifteen years of age goes without saying. In sick people twenty-five to thirty calories are rather indicated, except in special cases, such as consumption. For the more important exemptions we refer the reader to special treatises on the subject, preferably to that excellent work by A. Gautier[1] from which we shall have frequent opportunity to quote.

The calories are produced by the combustion

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[1] A. Gautier: "L'alimentation et les régimes," Paris, Masson.

of the food. Two principles must be here maintained: 1. Food develops in the human body exactly the same amount of heat as it does in the incubator of the chemist.[1] 2. In the sustenance of life no energy is consumed which properly belongs to it.—(*Berthelot.*) All energy utilized by the living organism is derived from the food and from the tissue itself.

It is simple enough to calculate the heat produced by the combustion of each foodstuff. We will classify the substances which serve as nutrients for our body into four divisions, viz.: the albuminoids, which include all nitrogenous substances; fats; carbohydrates; and inorganic matter (ash)—the latter is completely oxidized and of no calorific value. The others are each its own special coefficient.

1 gram of albumin gives when burned 4 calories..... 4
1 gram of fat gives when burned 9 calories......... 4
1 gram of carbohydrate gives when burned 4 calories. 1

Now, if we know the composition of a certain article of food it will be easy to compute the number of calories obtained from it.

"We must not forget, however, that a part of

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[1]Always on the condition that the final state of the residue be the same in both cases.

all that we consume is lost within us and passes through the alimentary canal without being absorbed. We shall keep an account of this factor, i.e., intestinal non-absorption. The figures which we shall give for each food will correspond not with that which enters through the mouth, but with what passes the intestinal barrier—in other words they refer not to the substances ingested, but to the substances digested and utilized by the organism.[1]

We have thus briefly described the laws governing the general fixed principles as well as energy itself. To this the labors of the hygienist would be confined if the problem of nutrition were not strangely complicated by a new factor of the utmost importance, which controls the whole system of the physiopathology of nutrition, viz.: alimentary reactions. The human body is a machine so delicate, so sensitive, that it reacts immediately, and in a manner of its own, to every substance which enters it through the tube. Each food acts in its own fashion on all the cells and on all the organs composed of these cells. Reaction exists by necessity, no

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[1]This has been rendered easy by the excellent tables so carefully prepared by d'Alquier.

matter how insignificant it may be in itself, no matter whether it has as yet escaped the investigations of the physiologist. If we take into consideration that ingestion takes place two or three times a day, we can easily understand what a weighty influence it exerts on the functions of the organs.

The reaction of food may be considered from three different standpoints: *a,* every food must be prepared and digested before it can be utilized by the cellular system, and then only does it possess the power of digestive reaction; *b,* every food is a source of energy, which gives a special impetus to the life of all the cells, and as such it exerts a general reaction; *c,* every food leaves a waste, of which the system must needs rid itself, and as such its reaction is eliminatory.

The digestive reaction is the strongest in evidence, but the least understood; again, the substances which require the smallest amount of digestion, such as water, salt, glucose, etc., modify, by their very presence, the physical and chemical equilibrium of the gastrointestinal canal. According to natural laws the greater part of the food is digested, and then it possesses

a twofold coefficient of excitation, i.e., glandular on the one hand and muscular on the other. The equilibrium which establishes itself automatically between these stimulations, be they strong or feeble, results in the harmonious and normal functions of the digestive apparatus, i.e., in secretions and peristalsis.

The ultimate general effects are sensibly more complex and present much of the unknown. The principles of alimentation produce a combined action upon the nutritive movements of the entire organism. Pascault very tritely says: "Life springs from an exciting cause and continues to subsist on it. The living cell passes from the dormant state into that of activity, having been called into existence by a demand coming from within."[1]

The excitations which we draw from the ambient center, emanate largely from the food which we ingest. Some foods have a much higher stimulating power than others. They accelerate nutrition, cost more, but give a double measure of life. Others possess only a very indifferent amount of stimulation and rather retard the cellular action, but make the living less

[1] Pascault: "L'arthritism par suralimentation."

expensive. Both are useful, on the supposition that they compensate each other, and that establishes a balance for maintaining the nutritive function on a physiological level. Apart from this general reaction which addresses itself primarily to each individual cell, food effects also a specialized reaction on each organ, nay, on each function thereof. Some of these are well understood; for instance, the action of beef-tea on the heart, of coffee on the brain, of sugar on the liver. Much, however, is still shrouded in mystery, and in this regard the task in front of physiological research is still very exacting.

Finally, the combustion of any food leaves behind certain residues, such as water, carbonic acid, inorganic salts, urea, uric acid, etc., which must be cast off in proper proportions and through the proper channels. Carbonic acid finds its escape through the lungs; other elements are eliminated through the kidneys, still others through the bowels, and some through the skin.

Even a hasty review of the albuminoids, of the fats, and the carbohydrates, throws much light upon this subject. Nitrogen intensely stimulates the digestive organs, glandular as

well as muscular; but its action is of short duration and of no lasting value. Fat, on the contrary, owing to its retarding action, tempers the excitations aroused by preceding influences; while the carbohydrates slightly fatigue the stomach; but they impart tone to digestion and prolong its action, thus facilitating the absorption of albumin and fats.

The general reaction differs not from this. Nitrogen here also acts as a stimulant by augmenting the activity of the organism. Fat, however, exercises an inhibiting influence which diminishes disassimilation, chiefly that of nitrogen. This selfsame retarding action is also very markedly observed in the carbohydrates which rather direct albumin and fats to the liver.

Resistance is very pronounced in the kidneys, because the *ternary bodies,* by reason of perfect combustion, leave but water and carbonic acid behind, while the nitrogenous residues engage exclusively the renal glands, often enough to the latter's discomfort and detriment.

A judicious proportion in their relative functions, in accordance to the physiological laws, may be observed in these three fundamental bodies. The calculations made in this direction

are based entirely upon experiments made with due care and diligence.

IN THE ADULT.

Albumin present.......	18.1 per cent.
Fat present...........	10.4 per cent.
Carbohydrates present...	71.5 per cent.
Grand total.........	100.0

Now taking into account the isodynamic coefficient and the total amount of calories required, we derive the following formula for the daily ratio in a man weighing about one hundred and thirty-five pounds:

Albumin..................	96 grams
Fats......................	55 grams
Carbohydrates.............	379 grams

These alimentary reactions represent the salient feature of the problem before us. They must ultimately determine our knowledge as to whether our method of feeding is built upon hygienic and rational principles or not, or, in other words, whether by filling our daily wants, we also afford such comfort to our organs as is compatible with the minimum amount of fatigue in the performance of their functions.

The exhaustive researches which are nowadays being made in this branch of medical science have for their object the establishment of precise laws and regulations affecting the hygiene and methods of nutrition. These will, naturally, occupy a prominent part in this book, the aim of which is to present, in a concise manner and so far as can be done, the good and evil effect on our system of everything that is placed before us on the table in the shape of food or drink.

We know well enough that, as a rule, the man who is in good health troubles himself but little about what he eats. While we appreciate that, from the general standpoint, he can and should be able to eat anything and everything that is eatable, yet we think that his diet should be so arranged that, so far as the limits and proportions which we intend to define are concerned, it should offer a variety sufficiently large for all purposes without giving undue preference to one or any. We shall take occasion, in its proper place, to point out certain useful details in the choice of foods adapted to the needs and requirements of individual cases.

The medical man should never lose sight of the paramount importance of dietetics in every illness, especially of the alimentary reactions. The functional troubles which father a pathological condition, more so than any anatomical lesion will do, demand of necessity the utmost circumspection and prudence in the selection of food, as to its nature as well as to its quality. Forbidden should be everything that, by its action, is calculated to give aid to the further development of the germs of the disease, but recommended all such as will neutralize, modify, or destroy them. Always bear in mind that there are diseases which are entirely, or at least in part, due to and arise from a faulty diet. These should be combated by diet only.

However, this specific field of therapeutics has a vast and complex compass. To facilitate its study, we shall present a review, as it were, of all the foods in common use, somewhat in the fashion of a dictionary, quoting for each indications and contraindications.

The chemical composition will be followed by a discussion of the food value, and then the reactions which explain and justify the same will be dealt with.

We apologize in advance for any repetitions which will unavoidably occur in a book like this. They appear to be useful, for they make the book handy and easy to consult.

MEAT

BUTCHER'S MEAT

MEAT, composed of the muscular flesh of the vertebrates, has constituted in nearly all ages a principal part of the food of mankind. During our time, under the influence of improved conditions and the accommodations of the market, its consumption has increased in astonishing proportions. If it has entered into the diet of the workman and peasant as an ordinary matter, it has assumed an exaggerated importance on the table of the wealthy. From 1852 to 1900 the yearly consumption per head has progressed (in France) from 42 to 79 pounds. This increase, which witnesses to a growth of wealth, is in all probability not equally favorable from an hygienic point of view. The meat diet encounters daily an ever-growing number of adversaries, and there is no food that gives rise to more varied and more interesting problems.

We shall study these problems more exhaus-

tively with regard to beef, which may be taken as a typical element of animal food. As for the other kinds of meat, we will go only into such details as distinguish them from the former.

BEEF

Albumin	18.00
Fats	14.00
Carbohydrates	0.00
Ash	0.72
Chlorids	0.06
Purins[1]	0.19

Available calories = 220

COMPOSITION AND ALIMENTARY VALUE

The essential characteristic of beef is its richness in nitrogen, only exceeded in cheese. The proportion of nitrogen, however, varies considerably according to the individual animal as well as to the cut. The fatter the animal, the smaller the percentage of nitrogen. The shoulder is the poorest cut, while the ribs of beef, sirloin, and rump belong to the richest and most savory pieces.

The figures given at the head of this chapter represent only the mean average.

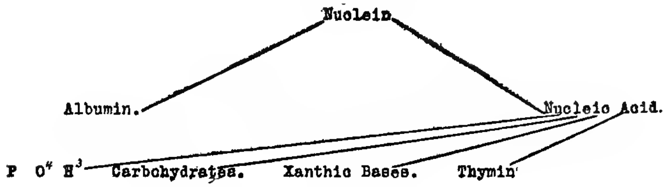
[1] The purins (puric bodies) always have reference to uric acid.

The nitrogen is composed of albuminoids, i.e., myosin, myostroin, myoalbumin, and partly of extractive substances belonging to the family of xanthic bodies.

These xanthic, or puric bodies, though small in quantity, are yet of such importance as regards quality, that, for certain diseases, foods may be divided into two categories, viz.: those containing xanthic bases, and those that are free from them. A few words on this subject, no doubt, will be considered opportune by the reader.

Xanthic bodies or bases, or puric bodies or bases, comprise a number of substances which are commonly derived from nuclein and possess the nuclein of purin.—(*Fischer.*) These substances are principally guanin, adenin, hypoxanthin, xanthin, and uric acid. By oxidation guanin becomes xanthin, and the latter is turned into uric acid. In a similar fashion by oxidation adenin gives hypoxanthin, and this again gives xanthin, and this in its turn again uric acid. Uric acid, therefore, is chiefly derived by oxidation from the xanthic bases which are contained in the urine in small quantities. The derivation of the xanthic bases

from nuclein is schematized in the following sketch.



Recent research has proved that urinary purins spring from two sources. Endogenetic purin is produced by the rejection of nuclein by the organism; its percentage, though variable in each individual, is a fixed quantity in each individual. Exogenetic purin, of alimentary origin, varies considerably according to diet, and may be reduced to zero by a regimen entirely free of all xanthic bodies.

The nitrogen of beef contains also collagenous, membranous substances, that boiling transforms into gelatin. Fat varies in inverse ratio to albumin, but in much stronger proportion, changing sometimes from 1 to 3. It lends to meat much of its taste and savory flavor.

The carbohydrates are either totally absent or represented only by traces of glycogen.

The mineral principles are relatively insig-

nificant, for beef is not a mineral food. We emphasize the scarcity of chlorid of sodium (salt), which fact puts meat in the class of dechlorated nutriments. On the other hand the superabundance of phosphates explains the frequent occurrence of phosphaturia, due to the excessive use of animal foodstuffs. Beef is a powerful factor in humoral hyperacidity.

Its alimentary value, which depends almost wholly on the percentage of fats present in it, is rather slight. It takes only second place to butter, sugar, bread, rice, and pulse. Moreover, nearly half of its calories are derived from albumin which itself is very inferior in producing energy. If to that the high cost of meat is added, it is hard to understand why beef should be held in such high repute as a table food. Its sole merit, from the alimentary standpoint, can only be, that it supplies within a small compass a comparatively large amount of assimilable nitrogen.

METHODS OF PREPARATION

Mankind very early formed the habit of cooking meat. Raw meat is nowadays used only as a sort of remedy, more or less acceptable according to the taste and liking of sick or ailing peo-

ple. Richet's research on its efficacy in tuberculosis has given it, nevertheless, a fresh claim on importance. He quotes the following recipe: An absolutely fresh piece of a prime cut is selected, it should be as far as possible without tendons. It is scraped with a knife, which detaches the pulp, and this is rolled up into balls that the patient swallows without masticating. It may also be served in warm bouillon or covered with powdered sugar. [Why not coated with the white of a fresh raw egg?—*Translator.*]

Aside from this exception muscular flesh is subjected nearly always to the action of fire, which develops its flavor. It is in this way, perhaps, a little less digestible, but it excites more thoroughly the gastric excretions and has stronger powers for reconstruction.—(*Richet.*)

The different methods of preparation affect its physicochemical qualities more or less favorably.

Boiled, the beef imparts to the water in which it is cooked a certain quantity of albumin, on the average 7 per cent, a great deal of fat, i.e., 20 per cent, of which a goodly portion is unfortunately lost in skimming, and much of the

mineral salts. The nutritive value of the beef would thus be much diminished, if it were not sustaining at the same time a concentration of nearly 40 per cent, which maintains the ratio of nutrition very effectively. Boiled beef, it is true, is more nitrogenous, but, on the other hand, it is impoverished in fats, demineralized, more insipid, and withal heavier on the stomach. We point out, however, that if kitchen salt is added while the soup is boiling, a large part of the chlorids will pass into the meat.

In roast beef a crust is formed on the surface, which greatly diminishes waste. A moderate roasting occasions a loss of only 10 to 12 per cent of water, 2 to 3 per cent of nitrogen, and 10 to 12 per cent of mineral matter. The loss in fat, however, is much greater, the average being 35 per cent. Of course this entails an impairment of nutritive value; but by compensation, as it were, the development of the flavors attains its highest degree, and makes roast beef the more savory and the more stimulating for the stomach. Stewed meat, cooked in the pan in fat, becomes more concentrated through evaporation, but the loss in nitrogen is small, likewise that of mineral matters, 2 to 3 per

cent, but is almost surfeited with fat to the detriment of the ambient center. It is more nourishing, but also heavier and less digestible. Excluding these methods of preparation the different sauces and gravies tend again to change and modify the nutritive value as well as the digestibility of the meat. In a general way all sauces containing butter or warm fats, all brown butter sauces and ragouts, etc., are bad. The white and piquant sauces also belong to this same category. On the other hand, meat cooked in its own juice, according to the custom of olden times (baked beef and beef à la mode), are foods good for the stomach and hygienic in a general way—it is meat which has not lost any of its nutritive principles, but remains sufficiently salty without overstimulating the appetite or causing the inconveniences that follow in the wake of surfeit.

A practice that can be recommended is to garnish the meat either with green vegetables, or, better still, with potatoes in any form or with dumplings or other farinaceous preparations. In this manner its deficiency in carbohydrates may also be compensated. Moreover, it adds variety and change to the diet and

excludes all excuses for overindulgence in bread, so common with many persons.

REACTIONS

A. *Digestive.*—Meat is essentially a stimulant of gastric secretion, in fact the most stimulating of all foods. It possesses a psychic action by means of its odors and aroma, and a chemical action through its extractive substances.—(*Pauloff.*) We shall endeavor to show how the methods of preparation affect the stimulating qualities.

The degree to which the meat is cooked governs the length of time required for its passage through the stomach. The closer the fiber, the longer it remains. A slice of roast beef is digested only at the end of three to four hours.

The stimulation extends also to the bowels, to the pancreas, and to the liver, and thus affects the general tone of the whole system. But this period of excitation does not last long and is soon followed by a passus of depression, the intensity of which is in direct proportion to the degree of excitation. However, it is complete, for meat leaves no residue.

Meat justly deserves the title of "gastric ali-

ment," in contradistinction to pulse and fruit, which are foods for intestinal digestion. This accounts for the fact that heavy meat-eaters at first experience a sensation of comfort, but soon begin to feel uneasy and sluggish, with a craving for more, i.e., renewed stimulation. Meat has no staying power, and leads to overeating and gluttony.

We have already stated that meat leaves no residue. That is the reason why an animal diet often is the cause for constipation and stasis, particularly in the large intestine. Although this is generally known, we yet consider it of such importance as to warrant us in giving it special mention here.

Meat also encourages the formation of micro-organisms in the canal and furthers putrefaction. Combe was among the first to show that the amount of sulphoether in the urine, the evidence of this putrefaction, is increased or diminished in proportion to the amount of meat consumed. His contention is sustained by many authorities. The excessive use of meat, it is claimed, gradually affects the intestinal flora by intensifying its virulence, changing its composition, and breeding enterocolitis and appendi-

citis. It is now generally recognized that nitrogen forms a splendid breeding-ground for intestinal bacteria, and that constipation helps to develop them.

Résumé.—Meat imposes upon the gastric muscles a slow process of activity, but vividly stimulates the glands of the stomach for useful purposes, whilst its action on the intestines is less favorable, because its excitation is of too transient a nature; the absence of residue inhibits peristalsis, and the extravagant content of nitrogen forms the germination of microbes.

B. *General.*—The reaction of the meat diet on the process of nutrition in general can be described in three words: it *excites*, it *acidifies*, and it *intoxicates.*

The *acceleration* of organic activity following the ingestion of meat is due to the predominance of nitrogen which diminishes the power of assimilation, to the absence of carbohydrates, and to the presence of extractive substances.

Under moderate circumstances this influence helps to maintain the general tone of vitality: it becomes harmful, however, when carried to excess.

Meat *acidifies* because its ash is acid, because

the phosphoric acid contained in it outweighs the basic substances, and also because its combustion is never complete, thus giving rise to acids, the most important of which is uric acid. In the carnivorous animals these acids are neutralized by an equivalent production of ammonia; but in man the formation of ammonia is very limited, and with an increased consumption of animal food the ratio of humoral and urinary acidity rises in proportion.

Meat *intoxicates* by reason of its basic purins and by ptomains, which easily become most noxious poisons to the heart, the vessels, and to the whole organism, though they are of indifferent value when present in a small volume. Moreover, the bacterial fermentations due to meat are of a toxic nature. Metschnikoff points out that to them chiefly is due premature senility.

To know the action of meat on nutrition only in a general way, does not suffice. It is of the utmost interest to understand the influence it exerts on each organ in particular. The first question which confronts us here is: In how far is meat necessary or useful to the man who performs physical labor, and to him who follows mental occupation?

Albumin, and in consequence all foods of which it forms the basic value, cannot furnish the amount of calories required for *manual* labor. Bouchard says: "Meat does not produce force." This function belongs to the ternary bodies. Yet, on the other hand, it seems to be proved that meat is a very useful article for the workman, the soldier, and the athlete, as it increases ability for work in the production of calories.—(*Gautier.*) Take, for example, the Anglo-Saxon race. They are heavy meat-eaters and excel in athletic sports. In sum total, meat does not supply power for physical tasks, but it assists in accomplishing them.

It is quite different in respect to *mental* work. If alcohol and tobacco have proved themselves powerful aids to the author in rendering his task easy, meat has never offered the same advantage. How often do not writers after a heavy meal, especially if it consists largely of animal food, complain of that sluggish, drowsy feeling which renders them incapable of accomplishing anything. At the Congress for Food and Hygiene, De Fleury insisted that meat is not an aliment fit for the mind, and that its use does more harm than good.

The *cardiovascular system* is likewise affected by a meat diet, chiefly by reason of its excess in extractive substances.

The pulse grows more rapid and harder, the tension is raised, whilst the vasoperipheral constriction increases the heart's action and predisposes the smaller vessels to sclerosis.

An exaggerated meat diet is one of the principal factors in hypertension and sclerosis.

Hepatic excitation is not less marked, since uropoiesis, the neutralization of toxic matter, imposes upon the cellular tissues extra labor. This excitation, which at first is limited to uropoietic tapping, soon invades the biliary and glucogenic functions also.

It would be interesting to know the influence of meat on the development and functioning of the intestinal secretory glands—the thyreoid[1] and genital glands, and the suprarenal capsules. As the functions of all these organs are antitoxic, it is likely that the use of muscular meat entails additional activity, but precise information on this subject is still lacking.

C. *Eliminatory.*—The ingestion of muscular

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[1] According to Leopold Levi meat is poison to the thyreoid glands.

meat reacts strongly on the kidneys. If urea, the issue of albumin, may be considered in the normal state as a diuretic, its elimination through a diseased kidney must be much more laborious. Uric acid and the xanthic bodies are substances which act as irritants to the renal capsules and are very hard to eliminate, and toxic issues from the intestines add still more to the task of urinary depuration. Experiments made by Hanssen prove that so far as calorific value is concerned, a nitrogenous diet produces the highest molecular elimination. Achard and Paisseau claim that the same regimen favors the retention of chlorids. All this leads us to the conclusion that meat has no favorable effect on the functions of the kidneys. Nevertheless, the question is rather complex, for it is a well-known fact that meat is often better tolerated in cases of nephritis, than one would be led to believe by this theory.

INDICATIONS AND CONTRAINDICATIONS

Since meat is easy to digest, is highly nitrogenous and stimulating, it should form a part of normal alimentation, especially in our epoch of strenuous life with all its exacting exigencies

and unforeseen fatigues. We all stand in need of it—the tiller of the soil as well as the toiler in the town. But if the rational use is beneficial, the abuse is equally obnoxious, and the daily ration must be carefully allotted. For the adult of an average weight of one hundred and forty-five pounds, 150 to 200 grams should be an ample allowance. Of course age must be taken into consideration. From the fiftieth year onward it is better to fall below this average, while very old people might dispense with it altogether. During the period of pubescence the allowance should be rather increased. "Up to the tenth or twelfth year meat should be given sparingly. From this time on the ration should be steadily increased. The average rations which I am disposed to grant are as follows: Meat, well trimmed, boned, and cooked, 100 to 120 grams from the seventh to the eleventh year; 120 to 160 grams from the eleventh to the sixteenth; 200 grams and over from the sixteenth year upward."[1] More abundant allowance may be made with benefit to frail and lymphatic children, and to such as are predisposed to tuberculosis.

[1] Legendre: Congrès de Paris, 1906.

In pathological conditions the use of meat is primarily indicated for all *weak* persons, *convalescents*, those suffering from *nervous* depression, and all who have to repair previous losses of any kind.

Tuberculosis is one of the most important indications. Grancher admits that in England the reduction of tuberculosis coincided with the increase of meat consumption. All authorities agree as to the necessity of heavy rations in nitrogenous food for this dire disease.

Gastric stimulation, uplift of tension, increase in humoral acidity, are all of the utmost benefit in cases of weak tension and of hypoacidity of delicate stomachs. Richet has demonstrated that raw meat possesses merits of especial efficacy, though he does not give satisfactory reasons why. We have already described his method of preparation. But 150 to 200 grams per day should be sufficient for all purposes, and according to A. Robin and Binet this amount should not be exceeded.

Labbé and Vitry have pointed out the dangers of superalimentation in tuberculosis, especially in its advanced stages, as intestinal absorption of nitrogen decreases in the same ratio

as ingestion increases. Mousseaux calls attention to cases of *renal lithiasis* due to the same cause. It is useful to know these facts, for, while they prove that nitrogenous superalimentation in tuberculosis may be reasonable and proper, still its utility is by no means as yet established beyond a doubt.

Meat is also an appropriate food for *diabetics,* on account of its small content of carbohydrates, but we say this with caution, as it may have evil effects as well. Renal, cardiovascular, and cerebral complications—the latter occur frequently enough—are pregnant reasons for restricting, if not entirely suppressing, the use of meat. *Coma, tendency* to *coma, exaggerated acetonuria* constitute absolute contraindications; recourse should be had at once to an alkalizing and antitoxic regimen, vegetarian by preference.

Even in ordinary cases of *diabetes* without complications a nitrogenous diet should be carefully considered, as some patients make sugar with albumin. Linossier and Lemoine have shown that it is necessary to distinguish between glycosuria from alimentation (the urine voided fasting does not show traces of sugar), in

which case meat is excellent, from glycosuria of nutrition (the maximum of sugar is in the urine of the fast), when the albumin must be reduced to its minimum.

In nearly every diet advised for *obesity*, meat plays a prominent rôle, because it possesses the advantage of being deprived almost entirely of fatty substances, thus increasing the activity of the organism; but it must not be eaten with greasy gravies. Moreover, particular account must be taken of the state in which the liver, heart, and blood-vessels are found.

Its use in *gastrointestinal* affections is still very much under discussion, and opinions differ widely. In one point, however, they all seem to agree, viz.: that the meat should be roasted or boiled, and eaten without gravy or sauce, cut into small morsels, or minced, or passed through a coarse strainer.

It is generally advocated in *hyposthenia* and in *dyspepsia by insufficiency*, in all of which cases it serves to stimulate the secretions. Likewise in *gastric putrefaction*, as the albumin does not ferment in the stomach.

In *hyperchlorhydria* Dujardin-Beaumetz rejects it as too exciting, A. Robin admits it as

useful for saturating the hydrochloric acid. We are inclined to believe with him that it should be allowed in small doses, roasted rather than boiled. In certain cases aggravated by stubborn vomiting and emaciation, a broth made of meat powder, according to Debove's method, will give very good results.

In *cancer*, in cases of *inveterate chronic gastritis*, meat is neither tolerated nor is it desirable. Besides, all general symptoms should be carefully watched in the patient, because the rules laid down for these instances are subject to numerous exceptions.

Minced or raw powdered meat is very serviceable in *obstinate chronic diarrhea*, so prevalent in hot countries. Both improve the general condition, especially that of the bowels. The same beneficial results will be observed in persistent cases of *enteritis* in children and infants. Nobecourt and Rivet have arrived at very interesting conclusions regarding this subject, viz.: if salts are very abundant and liquid (aërobic flora), raw meat is indicated. If, on the contrary, they are less abundant and very fetid, nitrogen is injurious and a lacto-farinaceous regimen is required (anaërobic flora).

A meat diet is also useful in *enteroptosis* in adolescents, and in the adult with weak and debilitated digestive apparatus who, indeed, stand in need of gastric rather than intestinal alimentation. But it does in nowise agree with *enterocolitis, constipation,* or any kind of disease that inclines to *cecal stasis.* At any rate only the most moderate use is advisable under these circumstances, and then only if the meat is unquestionably fresh. Game and delicatessen, which precipitate putrefaction, must be totally avoided.

There are cases in which meat is unreservedly good and useful; but those in which it is harmful and absolutely injurious are much more numerous. The latter comprise chiefly all affections of the *heart* and of the *vascular* system, of the *kidneys, liver,* and *nervous system,* and last, but not least, *diathetic arthritis.*

In *arterial cardiopathy, hypertension, vascular sclerosis, aortitis,* and *angina pectoris* it is always injurious. Huchard has proved its nefarious effects in the genesis of a whole series of symptoms, beginning with *toxic alimentary dyspnea.* The physician should direct all efforts at his command toward the most rigid exclusion

of all meat foods. He may relent somewhat in cases of *valvular insufficiency;* the animal diet should be regulated by the degree of compensation observed.

The use of meat in diseases of the *kidneys* is a rather involved problem. In all acute attacks of *uremia* it must be absolutely prohibited, while in *orthostatic albuminuria* it will do more good than harm. Between their two extremes we range all forms of *chronic nephritis*—more or less compensated—for which absolute rules cannot be given. Although muscular meat does not agree with all such cases, yet it cannot be made the object of a sweeping prohibition. The excellent articles by Widal on dechlorated diet, of which meat forms a part, have contributed much to generalizing its employment. A careful watch on the diuresis and albuminuria of the patient will be a great help in testing individual tolerance. It will be found that by some it is borne badly, while in others, especially in younger subjects, it has a tendency to diminish the albuminuria and to improve the general condition. But frequent changes in the diet are always beneficial. The more acute the congestion of the kidneys, the stronger the misgivings

as to the effects of meat, is a good axiom. In cases of inflammation it is less frequently tolerated than in fatty degeneration.

Wisdom in the choice of meats is another commendable factor in the diet; fowl and ham should always have the preference, whilst game, liver, etc., should be kept from the menu.

In liver complaints Robin establishes the following rules: Meat stimulates the cellular functions, it must therefore be forbidden in all cases in which these are already exaggerated, such as *hypertrophic biliary cirrhosis* in the *initial* stages, *atrophic cirrhosis, congested enlargement* of the *liver* in *arthritis* and all *malarial affections* and *colonial diseases,* and in *lithiasis,* in order to prevent the formation of calculi. As it wears out the parenchyma, it can only do harm in acute *jaundice,* acute *yellow atrophy* of the liver, and in the advanced stages of *atrophic cirrhosis.* But if given in small doses, its stimulating action may be well utilized in the milder insufficiencies, such as in the initial stage of the second period of *Laennec's cirrhosis,* and in *jaundice* as soon as the skin begins to get clear again.

In *nervous diseases* the rules are not so severe,

although sensible restriction is always counseled, and this applies with similar force to all cases of *hypertension* and *neurasthenia,* and all affections involving *lesions.* Some authorities are beginning to trace the origin of certain diseases, the etiology of which is vague and unknown, to intestinal troubles of very old standing. Londe insists that the source of the symptoms, and in fact the whole genesis of nervous diseases, may be found in the diet of the patient, and he does not hesitate to consider meat as one of the most untrustworthy factors in this connection.

We have reserved the consideration of *arthritis* to the very last, because in this class of diseases an animal diet plays such an important rôle and is so difficult to control. Arthritic patients are apt to eat too much, they do not digest their food, are troubled in consequence with hyperacidity and autointoxication. Meat tickles the palate and stimulates the appetite to surfeit. In this manner oxidation is lessened, acidity and autointoxication are increased, and nutrition is seriously hampered. If arthritis is due to overfeeding, it should be charged principally to the abuse of meat. It is simply sur-

prising to see morbid symptoms, such as neuralgia, articular pains, migraine and skin diseases vanish as soon as the patient gives up meat in every shape and form, after therapeutic agents have failed to respond. We shall refer to this again later on in the chapter on vegetarianism.

While speaking of *arthritis*, we take occasion to particularly mention renal *lithiasis* and *uricemia* in general, *skin diseases* (*eczema* particularly), and *hepatic* manifestations. So far as *gout* is concerned, the authorities are of different opinions. Pascault and de Grandmaison[1] are in favor of unrestricted abstinence. Garrod, Ebstein, Cantani, and von Noorden advocate a moderate use. Von Noorden claims that meat has the power to dissolve uric acid by its content of thymic acid, and advises to test the susceptibility of every patient. His method of procedure is as follows: The patient is to be put on a strictly antipuric diet. The uric excretions are to be carefully examined each day. The allowance of meat must not exceed 100 grams. If 50 per cent of the purins ingested (the rest is always oxidized) are found in the urine, the elimination by means of the urine is normal, and

[1] De Grandmaison: Traité de l'arthritisme.

the allowance of meat may be continued. If otherwise, it must be discontinued. The same test may be made with 150 to 200 grams. Nevertheless, we are inclined to the belief that gouty subjects might do well with a smaller amount of nitrogen, as they have the tendency to make uric acid even with albumin.

PRESERVED MEATS

Those preserved in tin cans lose some of their nutritive power and should never be given to patients of any kind. As a rule they are put up under a temperature of 225° to 230°, and are hermetically sealed. Generally speaking the muscular portion of the meat retains its nutritive quality, and also the flavor of cooked meat, while the high temperature destroys the microbes and toxic elements, always supposing that the meat employed is absolutely fresh and untainted. But the utmost care should be exercised in the soldering of the tins. It must be done on the outside of the cans and never come in contact with the jelly that forms a cover to the meat. Unless these precautions are observed, ptomain-poisoning is sure to result.

Salting does not modify the composition of

muscular meat to any appreciable extent. Pickling slightly disintegrates the albuminoids, and, perhaps, the extractive substances to a higher degree even. Meats prepared in this fashion, however, are certainly less toxic and should appeal to persons who are afraid of auto-intoxication. Unfortunately they are slightly hyperacid, as a part of the alkaline phosphate of potash is lost in the pickle. Still this is in a certain measure compensated for by the presence of salt, although it is a feature objectionable in cases of nephritis. Smoked meats are a trifle too rich in albumin, but their digestibility is often enhanced by the process, and delicate stomachs that reject cooked meats will in many cases tolerate them very well indeed.

Refrigerated meat, according to Gautier, loses none of its essential qualities, and shows but slight modifications of its original composition.

VEAL

Albumin	18.00		
Fat	0.08—	Chlorid...	0.06
Carbohydrates..	0.00		
Ash	0.79		

Available calories = 155

The value of *veal*, which has for a long time, under the name of white meat, been held in high repute, though quite unjustifiably so, is in many ways inferior to that of beef. Being poorer in fat, it is less nutritive, deficient in myosin, but stronger in resisting the action of the acid juices, and it is less digestible, as has been demonstrated by the experiments made by Penzoldt. Moreover, as is the case with all fresh meats, it is surcharged with nuclein and xanthic substances, and therefore more toxic. Many persons, although not dyspeptics, cannot eat veal without discomfort, an idiosyncrasy which cannot be accounted for.

Cases of ptomain-poisoning by veal are of frequent occurrence, and are generally accompanied by grave symptoms, such as severe diarrhea and general intestinal intoxication. Veal is unfortunately consumed to a great extent in

country districts. It should be prohibited in all cases of *dyspepsia, eczema, uremia, nephritis, cystitis,* and *catarrh* of the *urinary tract.*

HORSE-MEAT

As the consumption of horse-meat is constantly on the increase, especially in large cities, it is necessary to give it some attention here. Its composition stands no comparison with beef, on account of the small amount of glycogen it contains (0.5 to 4.5 per cent). The food value is the same. The absence of cystin in the muscles recommends it rather as suitable for raw-meat cures. It is wise, however, to take here into consideration that a great many worn out, emaciated, and exhausted horses find their way into the slaughter-houses, and that for this reason alone horse-meat in general not only possesses a lesser grade of value as a food, but is in many instances absolutely injurious to the consumer.

MUTTON

Albumin	15.30		
Fat	16.00[1]	Chlorid	0.06
Carbohydrates	0.00	Purin	0.11
Ash	1.00		

Available calories = 170

Mutton is not quite as rich in albumin as beef, but it contains more fat and mineral substances. Its nutritive power is, therefore, lower, but it is not as readily digested. Uncooked it has great renown as a cure for consumption.

Lamb may practically be accepted as the equal of mutton, though it is rather insipid in taste.

PORK

Albumin	16.20		
Fat	32.10[1]	Chlorid	0.06
Carbohydrates	0.00	Purin	0.10
Ash	0.50		

Available calories = 370

Excess of fat and close fiber of the meat are the characteristics of pork, which make it less digestible. Many stomachs cannot bear it.

[1] This includes the fat underlying the skin, which is always present in abundant quantities.

But its nutritive value is higher, while the price is lower than that of beef. Thus it is one of our staple foods.

Pork is at times tainted with trichinæ (trichinosis), parasites which live in the muscular tissue and affect man seriously when introduced into his system. On the Continent of Europe this danger is greatly forestalled by a rigorous, governmental inspection of the slaughter-houses.

Ham deserves special mention here. Because the meat of the ham is finer and shorter in fiber, it is easier to digest, and forms a valuable food in cases of gastric or intestinal dyspepsia. In *nephritis* it may be recommended for the reasons that it is easily assimilated and puts no strain on the kidneys; likewise in cases of *albuminuria* or *hepatic congestion,* as it allows but the minimum amount of albumin to pass through the kidneys.

* * *

We now come to a category of foodstuffs which hardly contain any muscular fiber, and, therefore, do not deserve, properly speaking, the name of meat-food. But since they are of animal origin, this certainly is the place for mentioning their qualities and properties.

We mean the entrails (tripe, etc.), glands, heart, and the tissues and organs less differentiated, such as the skin, bones, and tendons which we shall divide, according to the nutritive qualities so intimately connected with their histological structure, into three classes, viz.: gelatinous substances, glands, and those organs which are rich in nuclein.

GELATINOUS SUBSTANCES

These comprise the head and feet of the swine, calf, lamb, and mutton. They contain some muscular tissue, assimilable albuminoids, and a small percentage of fat. The chief constituents, however, are elastic and connective tissues, the periosteum and cartilage, which, when boiled, are transformed into gelatin, rich in nuclein. To obtain good results and proper assimilation, prolonged cooking is required.

Gelatin is a most useful agent for the human economy, and, we think, ordinarily too much neglected.

Gelatin possesses very valuable properties. Being totally absorbed by the intestines, it exercises a marked influence on the economy of metabolism. Its action is primarily directed

toward the albumins, but affects also in a lesser degree the fats. In the first instance it exceeds that of the carbohydrates by two.

Numerous experiments have demonstrated that the addition of gelatin to food notably reduces the ratio of nitrogenous repair.

Gelatinous foods are particularly recommended to those who get easily *overheated,* or who must build up their system: *emaciated, convalescent,* or *jaded persons.* A. Robin claims that they are of great service to *consumptives,* in whom disassimilation always takes place in an exaggerated measure. On the other hand, they are pernicious in cases of *gout, uremia,* and *arthritis;* and, on account of the excess of nuclein contained in them, also in *nephritis* and *dyspepsia.* But there is no reason why these patients should not partake of such jellies that are nutrient as well as agreeable to the digestive organs. Senator recommends for treatment of *ulcers* a diet composed of gelatin, sugar, and fat.[1]

[1] The formula is as follows: Dissolve 15 to 20 grams of gelatin in 200 grams of water, add 50 grams oleosaccharin of lemon. To be taken within twenty-four hours together with ¼ of a liter (½ pint) of cream and 30 grams of butter. The total =900 to 1,000 calories.—(*Berlin Medical Society,* January 8, 1906.)

ORGANS RICH IN NUCLEIN

LIVER, KIDNEYS, SWEETBREAD (THYMUS GLAND)

All these organs, which come from cattle, calves, or pigs, are rich in nuclein. Sweetbread easily takes the first place in accordance with the histological formula of its composition. Liver contains only one-fourth the amount of nuclein found in sweetbread, and kidneys even less than that. On general principles none of them is fit for use in cases of *uremia, gout, stone,* or *arthritis.*

LIVER

Albumin	19.9		
Fat	3.6—	Chlorid...	0.08
Carbohydrates...	0.5—	Purin	0.33
Ash	1.6		

Available calories = 145

Gelatinous substances are present in abundance. Glycogen varies from 1 to 16 per cent. Lecithin and phosphorous fats are plentiful (see Eggs, page 152) in goose liver, even up to 30 per cent. These, combined with nuclein, make liver a food rich in organic phosphorus. As it is readily and quickly digested, it may be strongly

recommended to *convalescents*, in the *period* of *adolescent growth*, to *phthisical individuals*, and in cases of *slight neurasthenia.*

Liver is frequently employed as an organo-therapeutic medium in *icterus*, *atrophic cirrhosis*, and *hepatic sluggishness.* It should be taken raw, or but slightly cooked. A temperature exceeding 140° Fahrenheit coagulates the albumin and destroys its useful ferments.

Pig's liver is preferable, but it must be quite fresh. The dose is 100 to 200 grams. It may be administered raw as an enema after it has been crushed and emulsified with the serum, or by the mouth after being slightly cooked, in order to remove its disagreeable, insipid taste.

KIDNEY

Albumin	18.4		
Fat	4.5		
Carbohydrates...	0.0—	Chlorid...	0.26
Ash	1.2		

Available calories = 124

The absence of glycogen, and the negligible quantity of lecithin it contains, diminish the nutritive value of kidney. Nevertheless it is a food easy to digest; but, to be good, it must be

taken from young, herbivorous animals. The kidneys of old and carnivorous animals should be eschewed.—(*Gautier.*)

The renal glands have also been employed in organotherapy in *albuminuria* and *sluggishness of the kidneys.* The results obtained are, it is true, of a contradictory nature; but cases are on record in which marked improvement has been observed. It may be administered like the liver, either by the mouth, raw or slightly cooked, or as an enema emulsified with the serum.

SWEETBREAD

Albumin	22.0		
Fat	0.4		
Carbohydrates	0.0	Purin	1.20
Ash	1.6		

Available calories = 123

Besides its exceptional abundance of nuclein, which alone gives it a predominant place among phosphoric nutrients, it abounds in collagenous substances. It is easy to digest and may well be recommended—even more so than liver—to convalescents, and to debilitated and nervous persons.

BRAIN

Albumin	12.78
Fat	15.59
Carbohydrates	0.00
Ash	0.89

Available calories = 202

Although it is poor in nuclein, it contains a surplus of lecithin approaching that of the yolk of the egg. At all times brain has been considered a typical phosphoric nutriment. In this regard it is only second to the yolk of the egg and to sweetbread in the animal kingdom, and to spinach, cabbage, the legumes, and barley in the vegetable kingdom. It is nevertheless a food for rephosphatization. It is easy of digestion, if one is careful in removing the membranes. It agrees marvelously well with *convalescents* who have a weak stomach, and benefits those who suffer from *depletion* of phosphorus.

MARROW

Albumin	1.87
Fat	88.04
Carbohydrates	0.00
Ash	1.53

Available calories = 862

Mark the heavy proportion of ash and of fats which, moreover, are phosphoric fats. Marrow is, indeed, a nutrient, phosphoric, mineralized food element. The figures which we have given soar up to those given for beef in the adult animal. In young animals fat is not yet abundant, but nuclein is fast accumulating, whilst the marrow is still active in the process of blood-making.

That is the reason why the marrow of young animals is employed in organotherapy for certain cases of anemia due to inability of making blood-corpuscles. Very encouraging results have been obtained in *aplastic anemia.* The method of administration is the same as indicated for liver and kidney.

DELICATESSEN

Under this name we comprise a considerable number of foods, in the preparation of which nearly all parts of the animal, predominantly those of the pig, are utilized. Every country has its own individual style and recipes, and its own particular names and labels. We must, therefore, here confine ourselves on general principles to a few words as regards these products of universal consumption.

A mixture or medley of cooked or raw meat materials, the offal which cannot be used in its natural state, such as the heart, the lungs, the spleen, the blood, fats, with spices varying in number and quantity, all are used in this enterprise, and they possess a fairly high food value.

Perhaps they are also enriched by the addition of vegetable substances as, for instance, the famous pea sausage of the German army. But that is, perhaps, the only good quality they possess, for from the hygienic standpoint they present many defects.

1. They are a food hard to digest, placing a heavy embargo on the stomach as well as on the bowels. The materials used for making them

are heavy, especially so if they cannot be cooked. Besides, foreign products may be introduced unbeknown to the consumer.

2. They are apt to produce intestinal putrefaction. Waste material and decayed matter may slip in unperceived in the manufacture. Even if well made, they yet offer an excellent culture medium for intestinal microbes.

3. They constitute also an ever-present danger of infection to the whole system.

4. Moreover, they are a food relatively expensive. One gram of nitrogen contained in this foodstuff costs more than that contained in fresh meat.

With rare exceptions they offer but a mediocre means of sustenance to the person in good health, and it is always wise to distrust them, for they certainly are crude materials. It is a matter of regret that these preparations have obtained such a prominent place on the tables of the poor.

It is needless to say that they are forbidden the sick, all who have delicate stomachs, who are afflicted with *intestinal fermentations* and *intoxications*, or who suffer from *heart trouble* or *Bright's* disease, *eczema*, *gout*, *liver complaint*, or *arthritis*.

SOME PARTICULARS

Sausage is made of meat offals and the fat of either beef or pig, highly seasoned, finely chopped, and pressed into cleaned entrails of some animal. The food value of sausage depends upon the characteristics of its constituents. The following table, compiled by d'Alquier, shows the composition of three of the best known varieties:

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Cervelat	23.21	43.62	0	4.48	512
Ham Sausage	37.06	34.10	0	3.66	483
Sausages, small, for frying	16.62	37.71	0	2.85	427

The *small sausages* which are sold in links, chiefly for the breakfast-table, are rich in grease, and must be well cooked or fried.

Head Cheese is a mixture of different kinds of meat, gelatin, and bouillon, and contains: albumin, 19.89; fat, 32.16; carbohydrates, 0; ash, 2.36; calories, 389.

Galantin is a mixture of pork, ham, and fowl, contains less fat, and, therefore, less nourishment, but is easier to digest and more harmless. Albumin, 41.30; fat, 6.10; carbohydrates, 0; ash, 1.88; calories, 239.

Meat-pie is harder to digest, on account of the paste and crust (see Pastry, p. 201).

It is made of all kinds of meat—veal, pork, duck, game, etc., which naturally impart to it all their own good or bad qualities; but hot it is always heavier than cold.

Paté de fois gras shows albumin, 16.30; fat, 38.34; carbohydrates, 0; ash, 1.67; calories, 432.

It is a very nourishing food, rich in lecithin, and often enough easily tolerated even by delicate stomachs. This is particularly the case if the liver is taken from geese or ducks especially fattened for the purpose. As it is highly seasoned and contains truffles, those who suffer from *Bright's* disease, *arthritis*, or *eczema*, must eschew it. For making adipose tissue it is of great value, likewise to consumptives.

Black pudding, or *blood pudding*, made of the blood of pigs and lard and spices, is heavy and indigestible. It is generally eaten with mustard. Blood is a good culture medium for microbes, for which reason the pudding should always be absolutely fresh and thoroughly cooked. It is not a dish to be recommended, despite the fact that it is rich in iron.

POULTRY

BARNYARD MEATS

COMPOSITION AND FOOD-VALUE

	Albumin.	Fat.	Carbo-hydrates.	Ash.	Chlorids.	Purin.	Calories.
Chicken...	18.87	12.89	0	0.77	0.06	0.15	204
Pigeon....	21.97	3.71	0	0.85	0.06	....	131
Duck	22.58	4.94	0	0.91	0.06	....	145
Turkey ...	20.95	21.76	0	0.75	0.06	0.15	299
Goose.....	15.21	31.86	0	0.41	0.06	....	366
We add here							
Rabbit..	22.59	4.06	0	0.85	0.06	0.11	137

Generally speaking, the percentage of nitrogen is higher than in beef. Uric acid is also more abundant, as is the case in all birds. The nutritive power depends on the proportion of fat which abounds in goose and turkey, but is scarce in pigeon, duck, and rabbit.

USE AND METHODS OF PREPARATION

Fowl is principally served roasted, and all that we have said about butcher's meat is here applicable. When fried, fowl is serviceable to *dyspeptics*, as the congealed fat is easy to eliminate, while it appeals also, perhaps, more to the taste and is less stimulating.

Fowl should be bled and not choked.

REACTIONS—INDICATIONS

For a long time a distinction was made between *white* and *red* meat, attributing to each quite different qualities, strongly in favor of the white meat. It was claimed that the red meat produced excitement, congestion, and toxins, while the white meat was easier to digest, less irritating, and devoid of troublesome after-effects. Opposite effects in the temper, mood, and character of man were attributed to the red meat. So it was said that when Garrick, the famous English actor, had to appear in the rôle of a hero, he fed on roast beef; but on mutton when he had to play the simpleton. Science does not admit such ridiculous claims nowadays. In fact a complete reaction has taken place in this regard, and the tendency now is to give preference to the red over the white meats.

This new doctrine is quite absolute. The color of the meat is a matter of secondary consideration only, and can in nowise prejudice its physical or chemical properties. It cannot serve as the basis for a correct physiological classification. We will, however, make certain general observations on the comparative value of red and

white meat as foodstuffs, and separately consider the digestive and general reaction of each.

1st. So far as digestion is concerned it will be generally admitted that *chicken* and *pigeon* are better tolerated by weak stomachs than butcher's meat, because they contain less fat. This must be emphasized with regard to chicken in which the grain of the fiber or its membrane is ever so much finer. A *convalescent* or a *neurasthenic* with an *enfeebled* stomach can eat with more comfort and less risk the wing of a chicken than a piece of beefsteak.

On the contrary, *duck*, *turkey*, and *goose* are harder to digest than red meat, and should be rigidly excluded from the table of the *dyspeptic* and the *typhoid*-fever patient. We have already spoken of veal and pork. So it would be useless to revert to them here again.

2d. From a general point of view everything speaks in favor of red meat. It is more nourishing, contains more iron, and is an important article of food for the adult. It contains a sensibly smaller amount of extractive matter, and, in consequence, is less irritant and toxic.

In summing up we repeat that, if chicken and pigeon are of service to the feeble and dyspeptic,

the red meats are better for him who is recovering from an attack of arthritis.

GAME

COMPOSITION AND FOOD VALUE

	Albumin.	Fat.	Carbo-hydrates.	Ash.	Calories.
Quail	22.80	7.60	0	1.20	171.60
Thrush	22.87	1.68	0	1.14	116.42
Partridge	24.46	1.36	0	1.04	120-42
Venison	20.55	1.82	0	0.85	107.53

The meat of *game* possesses three principal qualities: 1. A high percentage of albumin; 2, a small amount of fat; and 3, a strong proportion of extractive bodies, particularly creatin. These are present in a higher degree in animals that are killed in the hunt, which should be prohibited by law. The violent muscular over-exertion, which precedes death, gathers in the muscular tissues, in fact in the whole organism, a mass of xanthic toxins which there is no time to eliminate.

Game undergoes frequently complicated culinary preparations, which unfortunately increase all its objectionable features. *Jugged hare, partridge in cabbage*, and others are risky dishes, because the toxins of the blood become mingled

with those of the muscular tissues. The same may be said about the salines (ragouts) of woodcock, in which case the entrails that are left in the bird invite infection and intoxication.

The habit of hanging game until it "gets high" is objectionable and antihygienic. The meat of game, like that of all wild animals, is rather harsh and tough. The cadaveric rigidity of the dead beast serves to increase these qualities. Moreover, the meat is generally several days old before it reaches the kitchen. Hunters are, as a rule, endowed with a veritable perversion of taste, and imagine that game appeals to the palate only when it is "high," i.e., when it smells strong and when putrefaction is already well advanced. The process of decay is not only accomplished by the formation of toxins, but is a genuine hotbed for micro-organisms, whence frequently spring gastric troubles and enteric disorders. We had a case of a strong, healthy man who contracted typhoid fever of the gravest nature from eating a partridge that was too far advanced. We cannot too strongly condemn such habits, which are bound to endanger the health of even the most robust.

Venison may be prepared in a perfectly safe and sound way by pickling in the following manner:

Place the best cut into a basin or large pot, add salt, pepper, bay-leaves, spices, etc., according to taste; pour vinegar over the meat, adding a few drops of olive-oil. Turn the meat over once or twice every twenty-four hours. This method will prevent the meat from spoiling, but will make it tender and give it a most agreeable flavor.

REACTIONS—INDICATIONS

Game is hard to digest, and favors a rapid development of micro-organisms in the intestines. It should be banished from the menu of *dyspeptics*, and those who suffer from *enteric* or *enterocolic affections*. Small birds, such as quail, thrush, partridge, lark, may here be excepted, on the condition, however, that they are absolutely fresh when eaten and have not been "hung."

Game, on account of the toxic substances it contains, is ever dangerous to the circulatory system; it contracts the small vessels and increases the action of the heart. For this reason

it is bad in cases of *cardiac affections* and *hypertension.* In *Bright's* disease its use should be prohibited, as it affects the renal capsules. It excites the nervous system, for which reason it is not suitable for *neurasthenics.* And for all these reasons it is not a fit dish in *arthritis, eczema,* or *liver complaints.* *Consumptives,* who are so much interested in watching their diet carefully, should make only small use of it.

EXTRACTS MADE FROM MEAT

BOUILLON, SOUP, BEEF-TEA

Albumin	1.21		
Fat	0.32	Chlorid	1
Carbohydrates	0.44		
Ash	0.31		

COMPOSITION AND FOOD VALUE

Soup contains a few of the divers constituents of meat, but in variable proportions. Fat is present only in small quantities, as it is generally skimmed off in the cooking. For delicate stomachs this is all right, but it takes a great deal of the nutritive quality away from the soup. Albuminoids are more abundant, unless they are largely removed in the skimming. The remainder is principally composed of albumin, which in the boiling is partially transformed into albumose and peptones; and also of gelatin derived from the meat fiber and from the bones. Xanthic matter is plentiful. Creatin, xanthin, hypoxanthin pass into the soup and constitute a large portion of its physiological properties. Salt evaporates almost completely. About four-fifths of the essential salts

in meat are lost, and have to be replaced by the addition of ordinary table salt. Unless salt is added artificially, phosphates, chiefly phosphate of lime, will predominate. The ash is acid.

Thus it will be seen that soup contains but a minimum of nutritive power. Pure water should only be added in the proportion of 1 liter to 40 grams of meat, which will preserve an abundant proportion of the mineral constituents.

How to Make Soup.—This is simple and easy enough. The best proportions, according to Chevreul, are: 2 pounds of lean beef, 2½ liters (5 pints) of water, 18 grams of table salt, and 110 grams of vegetables (carrots, turnips, leek, celery, etc.).

But if you want to make a really good soup, then plunge the meat into cold water and at once bring to a boil. This insures a more thorough dissolution of the meat substances. Of course, the soup must be skimmed before serving.

If the meat is put into water that is already boiling, the albumin is apt to coagulate on the surface and, by forming a crust or scum, to impede the proper issue of the alimentary compo-

nents; the meat may taste better and more savory, but the soup loses much of its value.

What is known as "*bottle soup*" is, however, the most nutritive of all, especially if it be taken only by the spoonful. The method of preparing it is as follows: Cut the meat, after removing the fat, into square pieces about three-eighths of an inch in thickness, and put them into a large-mouthed bottle which can be firmly closed. Without any additions, the bottle is placed in a steamer and allowed to boil for twenty minutes. Three hundred grams of meat will give about 100 cubic centimeters of a deep brown liquid, of good strong flavor and taste, which can be used *ad libitum.*

Soup made from the knuckle of veal has the advantage of being more gelatinous. Chicken soup is easy to digest, and also rich in gelatin.

Reactions.—The action of soup on the *stomach* is very marked. It strongly stimulates secretion. Pauloff has definitely proved that this stimulation is due to the extractive substances contained in soup to a very large extent. When the psychical fluid fails, soup steps in by starting the flow of the gastric juices which then continue to flow by its own force. Its use at

the beginning of the repast is, therefore, fully justified, especially in cases of *anorexia.*

The *intestinal* reaction is, however, quite insignificant. Soup is a typical gastric food. Consisting of peptones, xanthic matter, and salts, it is wholly absorbed by the system without further efforts on the part of the digestive organs.

The heart, the blood-vessels, the nervous system are all strongly affected and stimulated by it. Soup is really a nerve food, almost akin to alcohol and coffee. "The physiological effects produced by the creatin and xanthic leucomains, components both tonic and bitter, which are largely ingested in small doses and not injected under the skin, may well be compared to those of caffein and thein, which we derive from tea, coffee, and cocoa."—(*Gautier.*)

The action of soup on the renal functions is more difficult to calculate, because here certain elements have opposite effects. This much may, however, be claimed that, if taken in small doses and, granted, that the renal epithelium is intact, soup exercises a benign influence on the process of elimination, whether this be indirect by relieving the tension of or by giving tone to

the heart's action, or direct by means of the salts of potash present in it. This is the opinion of Gautier, who contends that soup accelerates the action of the kidneys. But the same dose that stimulates the epithelium when intact, may have the very opposite effect on the diseased tissue. It is certain that if the kidneys are disordered, soup carries into them those objectionable toxins quoted by its adversaries, the more so as it adds a large amount of salt to the injurious effects of the leucomains.

Indications and Contraindications.—Inasmuch as soup is, practically speaking, an extract of meat, it shares with the latter all its advantages and disadvantages, and we do not repeat ourselves when we here take occasion to emphasize its features.

It is an excellent food for the *feeble*, for *convalescents*, *dyspeptics*, *atonics*, and those with *low tension*. It is a food for remineralization, highly to be recommended to all who suffer from loss of the important mineral ingredients. On this head and as an aid to digestion, *consumptives* are well advised in making a moderate use of it.

The more important contraindications are *kidney troubles*, whether *acute* or *chronic*, on the

one hand, and *cardiovascular* affections of any kind, on the other. It is to be shunned by all who suffer from *hypertension*, *angina*, or from *atheromatous* or *aortic* affections. We have in view a case of a patient in full convalescence from an attack of asystole, who brought about a relapse of the gravest nature by eating a plate of soup surreptitiously.

In cases of *uremia*, *stone*, *gout*, or *arthritis* the prohibition of its use should be tempered with discretion.

In acute diseases soup may be given in small doses in types of general *asthenia*, but it should be forbidden at once if symptoms of *plethora* and *congestion* be observed.

JUICE OF MEAT

This approaches the composition of meat much more than soup. Although less nourishing, it possesses all its qualities, and is a regular muscle-builder. For consumptives it is a valuable food, because, according to Richet, all the antitoxic components of the meat enter into the juice if the pressure is sufficiently strong. Two hundred grams of raw mutton should be forced through a meat-press. The juice thus extracted

may be consumed either at the beginning or in the middle of the meal, or it may be mixed with the food. It may be taken by itself fresh or lukewarm, but it must be heated or boiled for fear of losing its therapeutic properties. In convalescent *hypopeptic* or *nervous* persons, and in cases of *chronic gastritis*, meat-juice will often stimulate the gastric functions—in fact, the whole system.

There is a large number of commercial articles which are prepared in ever so many different ways, the principal advantage of which is simply one of commodity.

EXTRACT OF BEEF

The best known of these is Liebig's Extract, so called after the famous German chemist. It is made by evaporization under pressure. The fat is removed by filtration, and the liquid is condensed in a vacuum pan, also under pressure, until it attains the consistence of a thick syrup. This method extracts all vestiges of fat and a goodly portion of gelatin. With the exception of this difference, meat extracts possess all the good as well as the bad properties, indications, and contraindications of soup; they are equally

rich in xanthic matter. It may be of interest to give here the formula of v. Liebig, the famous German chemist, for making a beef-juice from fresh beef:

Hydrochloric acid (dilute)........	30 minims (drops)
Water	$\frac{1}{2}$ to $\frac{3}{4}$ pint
Table salt........................	1 saltspoonful
Rump-steak, cut into small cubes...	$\frac{3}{4}$ pound

Soak for one hour. Strain through muslin cloth. Serve cold. Use a porcelain, glass, or horn spoon. It will stain silver or any other kind of metal.—(*Translator.*)

MEAT POWDER

Albumin......................	69.50
Fat	5.85
Carbohydrates	0.00
Ash...........................	13.25

Available calories = 313

Meat powder is very nitrogenous, but is a food of high value. It is manufactured in large quantities from dried meat reduced to a powder. It may be made at home by scraping the meat with a knife into a pulp, which is then allowed to dry in a steamer placed on a hot metal plate. This should be slightly inclined, so as to allow the fat to separate. Finally, it should be

pounded in a mortar. But it is well to bear in mind that it spoils quickly and grows rancid.

Meat powder is put to many therapeutic uses.

It is a food easy to digest, and will quickly restore losses in nitrogen. It may be added with advantage to other foodstuffs, such as soup or milk. Emulsified with a small quantity of mineral water it may be administered with the stomach-pump. As a sedative in *gastric troubles* it is highly recommended. Excellent results have been obtained with it in *hyperchlorhydria*, in cases of *denutrition*, *phthisis*, *gastric hyperesthenia*, and *obstinate vomiting*.

PEPTONES

The *peptones* are produced by the digestion of muscular meat, either by the aid of papain in the hydrochloric fluid, or by pancreatin in a solution of carbonate of soda. There has been much controversy about its alimentary value; but the question seems to have been finally settled in the affirmative. Among the subjects discussed was the balance of nitrogen. It was shown that up to 69 per cent of the usual albuminoids could be replaced by their weight with

peptones without disturbing the balance of nitrogen.—(*Gautier.*)

The true peptones are but seldom ingested by way of the mouth. They are chiefly administered by means of rectal injections for nutritive purposes. When carefully emulsified with bouillon, milk, or even wine, with the addition of 4 to 5 drops of laudanum, they are well tolerated, absorbed, and assimilated by the system.

In all cases where feeding by the mouth is impossible or objectionable (in *esophagous stenosis, gastric ulcers, incorrigible vomiting*) these injections should be given. They will often sustain the patient for weeks.

If by the mouth they are generally taken in the shape of peptonic preparations, commercial articles which are principally composed of albumin and albumose, and contain but a small fraction of peptones. Among these we mention *plasmon,* which is composed of:

Albuminoids.	Fat.	Carbohydrates.	Ash.
74.5	1.7	0	0.3

The available calories are about 350, but as intestinal absorption is frequently imperfect, this number is correspondingly diminished.

Some of the preparations, for instance, *pepton*

Kemmerich and *somatose*, are produced from muscular meat; others from the albumin of milk (plasmon and sanatogen), while *tropon* is a mixture of animal and vegetable albumin. All these substances have so far fallen short in actual practice of the results claimed for them. Requiring no mastication, leaving no residue and easily causing putrefaction, they often enough become irritants to the stomach and the bowels. Besides they have the disadvantage of being almost purely nitrogenous. Pepton Kemmerich and plasmon are perhaps the best among them.

They should never be made the basis for nutrition, should never be taken in large doses, but only for the purpose of raising the level of the alimentary ratio. They prove useful in cases of *insufficiency* of *nutrition*, in *cancer*, repeated attacks of *vomiting*, *anemia*, and for feeding up *phthisical* persons. With prudence and discretion they may be employed to advantage in *dyspepsia*, *cardiac affections*, and *Bright's* disease. But in cases of *enteritis* or *enterocolitis* their use must be strictly forbidden.

FISH

In respect to hygiene of food, fish proves a rather heterogeneous group. The great difference in the composition of the various species of fish entails a corresponding variety of properties and organic reactions. We have, therefore, decided to divide them into two classes by setting aside the usual division into salt-water and fresh-water fish, i.e., *less fatty fish* and *fatty fish*, a better physiological classification, we think, than the former, which also renders it easier to point out the indications and contraindications. We shall study the first class according to our usual plan. For the second class we shall content ourselves with simply pointing out the differences.

The crustaceans, mollusks, and shell-fish will be considered in a separate chapter. These deserve special mention, for in certain districts they form an important part of the diet of the inhabitants. (See pages 88-92.)

LESS FATTY FISH

BASS, PIKE, CARP, COAL-FISH, GOLDFISH, SMELT, GUDGEON, BULLHEADS, CODFISH (FRESH), WHITING, PERCH, PLAICE, SKATE, CATFISH, SARDINES (FRESH), TROUT

COMPOSITION—ALIMENTARY VALUE

Albumin	18.00	—Purin	0.057	
Fat	1.35	—Chlorid	0.07	(fresh-water fish)
Carbohydrates	0.00	— "	0.50	(salt-water fish)
Ash	1.07			

Available calories = 82

We have put together in this group all those in whom the percentage of fat varies from 0.50 to 3 per cent. The figures given represent the average composition of the sixteen kinds of fish enumerated.

So far as the nitrogenous element is concerned fish strongly approaches beef. The xanthic valids are in favor of fish, excepting which the flesh of fish has the same nutritive value as meat. Rosenfeld, after numerous experiments, came to the conclusion that fish gives the same satisfaction as meat, allows of the same utilization of forces by the navvy, the sportsman, the soldier as well as by those who lead a sedentary life. Many people, for instance the Japanese,

live almost exclusively on fish, and but rarely eat meat. Nothing can explain the prejudice which so many people have against this article of food. If fish is a little deficient in stimulating quality, naught but good can come from its use to the system.

In the variety under observation, fat is present in small quantities only, which, of course, reduces the caloric value. It is a fluid fat, however, rich in olein and organic phosphorus.

Mineral substances are present in smaller quantities than in meat. Phosphorus predominates, and fish may be styled a rephosphorating food. Lime and magnesia are found in rather large proportion; of iron there is scarcely a trace. Salt is very scant in fresh-water fish, but very abundant in salt-water fish.

METHODS OF PREPARATION

Fish is served either *fried* or *baked* or *boiled,* with or without sauce. The frying process, the white sauces, and the mayonnaise add the fat which is wanting, but add also to the troubles of digestion. Dyspeptics should give fish the preference over soup and white meat; but if they eat fish fried, they should only partake

of the meat of the fish and leave the fat on the plate. The custom to eat potatoes with fish has a practical value, as it supplies the want of carbohydrates.

REACTIONS

a. *Digestive.*—The meat of the less fatty fish is tender and delicate, easy to digest, does not excite, and passes quickly through the stomach. It seems to favor fermentation less than muscular meat, but it must always be absolutely fresh.

This question of absolute freshness in fish is of great importance. It is an essential quality, on which depend to a large extent its dietetic properties.

Absolutely fresh fish will never cause any inconvenience, but if it is spoiled even in the slightest degree, it becomes risky. Unfortunately putrefaction sets in with incredible rapidity, quite unknown in other articles of food, excepting shell fish; in the summer-time it requires but a few hours. The packing in ice is only a palliative, which frequently serves merely to mask the odor. In fact, a sort of maceration is produced in the water of the melting ice,

which accelerates decomposition when access of air is permitted. In the summer months it is, practically speaking, well-nigh impossible to obtain fresh salt-water fish anywhere, except at the seaside itself.

The danger is the greater, because the odor betrays putrefaction only in its advanced, and not in its incipient stage.

b. *General.*—This differs but little from that of meat, since the action is the same as that of any other nitrogenous foodstuff. But the scarcity of purin reduces the exciting influences on the heart and blood-vessels, and consequently on the whole system.

Attention is called here to the fact that certain lake fish, especially of the Lake of Geneva and of Annecy may cause infection of bothriocephalus latus (broad tapeworm).

c. *Eliminating.*—Reaction on the intestines depends entirely on the state of preservation of the fish. When quite fresh it has but a slight toxic effect on the renal glands; but, when spoiled, it fatigues the kidneys and may become a source of danger.

INDICATIONS AND CONTRAINDICATIONS

Fish constitutes the world over an excellent diet, possessing the same advantages as meat, without its objectionable features. As a popular food the less fatty fish, however, must give way to the fatty fish, which are certainly more nourishing; but the former are ever preferable in pathological conditions.

That is the reason why they agree so well with *dyspeptics* and in *hypo-* or *hyperchlorhydria.* It is advisable to eat the fish before the meat, as it assists the transitional process from the lacteal to the ordinary regimen. It must not be prepared with hot butter or fat, and must be absolutely fresh. There are dyspeptics who cannot digest fish bought in the city, but who tolerate a fish diet perfectly when at the seaside. In cases of intestinal trouble and under similar conditions it affords more comfort than meat.

It pleases the weak stomach of the convalescent, inasmuch as its richness in phosphorus and mineral substances renders it useful.

In *arthritis* and for *obesity* it may be well recommended as a change and a means to react on the abuses of the meat diet.

In *albuminuria* it is generally held to be injurious. Teissier considers it a food criterion of recovery, if fish can be eaten without showing an increase or reappearance of albumin. Daremberg claims that a fish diet (absolutely fresh) is not only inoffensive, but very useful in the treatment of *albuminuria*, in fact apt to bring about a genuine cure.

We believe also that eczematous persons have nothing to fear from feasting on less fatty fish fresh from the water.

FATTY FISH

SHAD, EEL (FRESH WATER), HERRING, MACKEREL, SALMON, TUNNY (SPANISH MACKEREL), TURBOT, MULLET

Albumin	18.50		
Fat	11.50—	Purin ..	0.13 (salmon)
Carbohydrates .	0.00—	Chlorid .	0.07 (fresh-water fish)
Salts	0.87—	"	0.50 (salt-water fish)

Available calories = 169

The percentage of fat is below that of meat, fluctuating between 5 and 13 per cent, except in the eel where it reaches 26 per cent. It varies, however, not only according to species, but also with the season of the year in the same species.

The fatty fish are more nourishing than the less fatty, also more nitrogenous, though poorer in mineral substances, but much richer in puric bases.

They are heavier on the stomach, as their flesh is firmer and more compact. Even when quite fresh they are apt to cause gastric and intestinal fermentation, and this objectionable feature is frequently intensified by the greasy and rich sauces which are served with them.

The action on nutrition, on the circulation and on the renal system, depends on the richness in purins which make them almost the equivalent of meat. We draw attention to the fact that the fresh serum of the eel has a toxic effect on the kidneys.

For these important reasons the use of fatty fish is contraindicated in all cases in which the less fatty fish may be recommended. In *dyspepsia, gastric* as well as *intestinal,* in *arthritis, obesity, cardiac ailments, Bright's* disease, and *eczema* their use will always prove harmful. To this list may be added *liver complaints, uremia, gout,* and *stone.* There are circumstances, however, under which they prove superior, for they are a valuable food for the normal, healthy

human beings, and especially so for the poorer classes. In a piece of beef cut from the neck—one of the cheaper cuts—one gram of nitrogen costs about 12 cents, and 100 calories about 17 cents. A fresh herring costs about 3½ cents. Fatty fish, moreover, may constitute a complete diet; that is to say, they may represent the only supply of food available for an entire race (Esquimaux).

In *diabetes* they are of great service on account of their high nutritive power and the absence of carbohydrates, although their use may even here be contraindicated by reason of other complications.

They should figure frequently on the table of *consumptives.*

Boiled fish with mayonnaise, sardines in oil crushed into a paste with butter and hard-boiled eggs, are most nourishing foods, rich in fat, and easily tolerated by the stomach, especially during the heated term of the year.

CRUSTACEANS AND SHELL-FISH

The crustaceans, mollusks, and shell-fish, occupy by no means a secondary place in the list of our foodstuffs, and perhaps justly so. We shall be brief in our remarks about this variety, which are considered to be often more harmful than beneficial.

	Albumin.	Fat.	Carbo-hydrates.	Salt.	Available Calories.
Prawns, shrimps..	25.83	1.57	0	3.32	128
Crabs.............	15.30	0.46	0	1.01	71
Lobsters..........	18.85	1.01	0	1.85	92
Oysters	9.71	1.14	0	1.62	53
Mussels...........	13.60	1.09	0	1.20	70

It is apparent that this category of food is rich in nitrogen, especially *prawns* (*shrimps*). Xanthic substances also abound, particularly in the crab and in snails. Fat is most prominent by its absence (lobster). But, as if by way of compensation, they are foods strongly mineralized. This, however, is again minimized by the fact that salt is present to such a large degree.

Snails deserve special mention here, as in some countries they are consumed in large quantities. They are a hard, tough, indigestible substance, which must be made piquant by the addition of spicy condiments to excite the

stomach. They are unfit for the sick-room, and present no advantage whatever to the hale and hardy.

Lobster, *grayfish*, and *crab* also have a hard, compact meat, and are difficult to digest. They are powerful excitants and full of toxins, not infrequently causing eruptions on the skin, nettlerash (urticaria), vomiting, and diarrhea. *Dyspeptics* should never touch them, and they should be barred from the menu in *cardiac* or in *Bright's* disease, in *arthritis*, and in *eczema.*

Shrimps and *prawns* are less dangerous; the meat is more delicate and rather rich in mineral matter, mainly phosphorus; the taste is refined and piquant, which justifies their use, especially during the summer months, for the purpose of whetting a sluggish appetite. Moreover, they have the advantage of being eatable without sauce or other bothersome additions. They must not be consumed in *heart* or in *Bright's* disease, nor in *eczema. Dyspeptics* and those afflicted with *arthritis* should not eat them, except once in a great while. But to *anemic*, *convalescent*, and *consumptive* persons they may be recommended.

Oysters and *mussels* resemble each other a

good deal; in fact, the mussel might be styled the oyster of the poor. Being less nitrogenous, they are easy to digest. They carry no undue excitement to the gastric regions, and do not fatigue them. Gautier considers them genuine condiments. The reaction on the general system, and particularly on the kidneys, is favorable. Still, there are objectionable features connected with them, as they frequently harbor intoxication and infection.

Ptomain-poisoning, which manifests itself in the same manner as in spoiled meat, i.e., by gastrointestinal intolerance and by dermic eruptions and headaches, is by no means of infrequent occurrence with mussels as well as with oysters. Their pathogenic properties have been the subject of much research during recent years. They are undoubtedly due to certain changes which take place in the liquor of the oyster, a truly living organic liquid. As in fish, these changes take place very rapidly, particularly with a rising temperature, and the toxicity increases in the same proportion.

Twenty hours after the oyster has been taken from its bed it requires 44 c.c. of its liquor to every two pounds of body weight of the victim

to kill a rabbit; after two days at 65° Fahrenheit it takes only 14 c.c., and after three days, at 75° Fahrenheit, only 6 c.c.—(*Baylac.*)

It is easy to understand the wisdom of the old saw: "Abstain from oysters during the months which have no 'r' in them," i.e., May to August, on account of the high temperature prevailing during that period.

The infection which seems to be more predominant in the oyster than in the mussel, is ascribed to the presence of pathogenic microorganisms. Typhoid, cholera, and Eberth's bacillus have been found in it. The cause of the disease in the patient can be traced beyond doubt to the consumption of these mollusks. The trouble is evidently due to the bad location of the oyster-beds, which not infrequently are too near the outfall of sewage. The attention of the proper authorities has, however, been called to these defects, and in many countries the oyster-beds have been placed under the surveillance of government inspectors, by which means much of the danger has been removed. Nevertheless, it is wise never to lose sight of the facts quoted above.

Mussels and oysters should not be eaten by

those whose intestines, kidneys, or skin do not function properly. Their peptogenic value, their richness in mineral substances and rare metalloids, such as iodin and bromin, make them serviceable for building up enfeebled constitutions. Convalescents, and those run down by disease, will be benefited by their use. The same holds good for *cancer*, *tuberculosis*, and *dyspepsia*, in *hyperchlorhydria* and *glycosuria*. For the latter disease particularly they possess, according to Bouchardat, a definite therapeutic value.

MILK

In milk we find a new alimentary constituent, and perhaps the most important of them all at any rate so far as quantity is concerned. We refer to the carbohydrates which are missing almost entirely in all of the foods described so far. The presence of this element makes milk form a natural transition from the rich regimen, composed chiefly of albumin and fats, to the vegetarian regimen, in which the fats almost entirely disappear and the nitrogenous content is diminished, thus leaving the carbohydrates in a predominant position. And it cannot be otherwise, for milk is in itself a complete nutriment, at any rate so far as the earlier months of life are concerned; later on the bad proportion of its constituent compounds, especially the insufficient quantity of certain mineral bodies, prevent it from being adequate to the wants of our organism. This is at once apparent when an adult is by necessity restricted to a rigid milk diet. Milk, besides fruits, has always

been one of the principal foods of the human species.

From the medical standpoint its importance consists chiefly in its dietetic and therapeutic value, inherent in its own essence or present in its derivatives, for cases of illness in which it may be employed either as a vehicle or as a means. An enormous number of problems come here into consideration which interest not only the physician, but the hygienist and the sociologist alike.

COMPOSITION AND FOOD VALUE

The composition of milk differs in every species of mammals. And again it varies in each species with the age of the individual animal, and according to the period of lactation. It also depends on the physical condition, i.e., the state of health of the individual animal, on stabling, grooming, surroundings, nature and method of feeding. The best that we can do is to give the average or mean composition of milk of each species, basing our calculations upon scientific experiments and analyses given by recognized authorities for different kinds of milk used for domestic purposes.

COW'S MILK

Albumin	3.28		
Fat	3.48—	Chlorid . . .	0.15
Carbohydrates . .	4.82—	Purin	0.056
Ash	0.53		

Available calories = 182

The density is about 1032. The figures given above do not, however, represent a standard by which adulterations may be detected. They are also somewhat below those usually quoted, but we wish to point out that we are dealing here with substances already in the process of digestion.

Milk is essentially composed of an opalescent plasm, in which myriads of butyric globules of $\frac{1}{100}$ to $\frac{1}{1000}$ m.m. in diameter are held in suspension. This plasm holds albuminoid substances in a more or less complete state of solution; also a special kind of sugar and different kinds of salt. For the better understanding of the subject we quote Gautier: "There are two kinds of bodies held in suspension in the plasm of milk, viz.: 1. Globules of butter which seem to contain an infinitesimally small amount of fatty substance encapsuled in a very thin, elastic

envelope composed of proteid matter. There are about 1,500,000 of these little balloons to the cubic millimeter. 2. Fine granulations of phosphates which are united in a special albuminoid nuclein substance."

The albumins of the plasm, which may form from 1.5 to 5.5 per cent, are casein and lacto-albumin. The first is found in a state of demi-dissolution. The lab-ferment, together with the pressure of the stomach, precipitates the acids into a clot (cheese), which becomes the more compact the stronger the acids are. This coagulation, like that of blood, is facilitated by the addition of salts of lime. The casein is peptonized by the aid of pepsin, and leaves an indissoluble residue, composed of nuclein and phosphorized paranuclein.

The lactoalbumin is suspended in the serum after caseation, and does not coagulate under heat.

Butter is the principal constituent of milk, and controls the food value. Large institutions, especially hospitals in Europe, pay for the milk they use, according to the proportion of butter contained in it, which varies from 30 to 82 grams per liter. It is formed by the coalescence

of the fatty substances contained in the butyric globules. To obtain it, the milk is allowed to stand, when a layer of cream, composed of these globules, forms on the top. The cream is taken off and churned, by which process the thin coverings of the albumin are broken, thus allowing the masses of butter to unite and assume a solid appearance. The *skimmed* milk, although deprived of the fats, is used for many purposes and quite fit for consumption. At any rate, in large cities it is difficult to obtain any other but partly skimmed milk. Although it is not as nourishing as whole milk, it is preferable in many diseases in which the patient can digest it with more ease. What is left behind in the churning is called *buttermilk*, an article of food which possesses excellent therapeutical properties, to which we shall revert later on.

The third nutritive element of milk is the *carbohydrates*, i.e., lactose or milk sugar. This is a bihexose, well known for its diuretic properties, which makes the sugar in diabetics.

The oscillations are a little less accentuated, varying between 3.50 grams and 5 grams per liter.

The mineral substances are relatively abun-

dant, furnishing about the twentieth part of the dry extract. They are not readily absorbed by the bowels.

While it shows 98.8 of albumin, 94.5 of butter, and 100 of lactose, 33.8 of the salts in children and 49.6 in the adult are not utilized. For this reason milk cannot be counted among the best mineralizing foods. Two elements are predominant, viz.: lime and phosphorus; the former to the extent of 1.60 grams per liter. Because this is not readily absorbed, being present chiefly in the shape of phosphate of lime (but slightly soluble), and because in infants three-fourths of it is rejected, milk cannot lay claim to being a first-class vehicle for alimentary chalk.

Phosphorus is also abundant, and is present chiefly in the shape of physiological values well differentiated; one portion envelops the casein under the form of nuclein; a second portion is present in the shape of lecithin analogous to that contained in eggs to the extent, in the mean, of 1 gram per liter. The rest is represented by phosphocarnic acid, or nuclein.

Gautier insists that the principal rôle of this phosphocarnic acid is to act as an agent in the

assimilation of phosphorus, lime, and iron by the economy. Cows' milk is unfortunately not well supplied with this agent, phosphorus, in the shape of nuclein, representing only 6 per cent of the total amount of phosphoric content.

It is well to bear in mind that, if the absorption of phosphorus is defective when milk is taken raw, it is still more so when it has been boiled or heated for some time, as this process separates a part of the lecithin while producing phosphates. As a phosphorating food milk is only of medium value.

Of other elements there are only a few: magnesium is rare, sodium chlorid about 1.50 per liter, iron about 0.004 gram.

Milk is essentially a living food. It contains a number of diastasic ferments, viz.: oxydase, yeasts giving solubility to the casein, and hydrolyzing amidin. Our knowledge of these is at present very limited, but their usefulness in the process of nutrition is unquestionable.

MOTHER'S MILK

Albumin	1.84 (–)		
Fat	3.52 (+)	Chlorid	0.05
Carbohydrates	6.11 (+)		
Ash	0.23 (–)		

Available calories = 66

Its composition changes somewhat toward the thirtieth year; a little later on it is less mineralized. Abundant feeding increases the amount of butter and sugar; underfeeding diminishes the amount of casein and of butter. Nitrogen declines during the period of lactation; butter and lactose vary but little.

Aside from the changes that take place in the distribution of nitrogen and the ternary bodies which we have indicated by + and –, mother's milk possesses certain qualities which make it differ from and superior to cow's milk.

1st. *Casein* is precipitated in finer and more granular floccules. Its digestion leaves no residue of nuclein.

2d. The absorption of the *mineral substances* is more perfect—80 per cent for the whole of the salts, 60 per cent for the lime, and 92 per cent for phosphorus.—(*Michel* and *Perret.*)

3d. *Phosphorus* is present in its organic state.

The following table, in which the amount of phosphorus per liter is given, will show the difference.

	Organic Phosphorus.	Phosphate of Casein.
Mother's milk.........	0.320	0.132
Cow's milk...........	0.180	0.580

4th. Although up to the present time no definite proof of their existence has been advanced, yet clinical facts force us to admit the presence in mother's milk of certain *specific ferments* which not only facilitate its digestion and absorption, but also the assimilation and fixation of the substances in the organism. It is also possible that their specificity is better adjusted, and that, thanks to them, the mother's milk agrees so much better with the infant.

ASS'S MILK

Albumin........................	1.79
Fat	1.30
Carbohydrates	6.07
Ash............................	0.35

Available calories = 44

This approaches more than any other in quality the mother's milk. It is very easy to digest. Casein is precipitated in fine floccules and leaves no residue of nuclein.

It is a valuable food, especially for irritable and shattered stomachs. It causes no inconvenience. As it is subject to rapid changes, it must be consumed soon after it has been drawn. It will keep fresh for a few hours only, but before being consumed should be warmed up to 100° Fahrenheit.

Mare's milk possesses pretty well the same qualities and composition, but is difficult to obtain in almost any country. It comes on the market, however, under the name of koumys (see page 131).

GOAT'S MILK

It is superior to cow's milk, as it is richer in casein, butter, and mineral matter.

METHODS OF PREPARATION AND HOW TO USE MILK

The most natural and cheapest method of using milk has always been to drink it raw. The "benefactions" of our present-day civilization, the crowding into large cities with its sordid consequences, has forced us to look upon the use of milk in its raw state as a source of danger, and to eschew its use almost entirely.

The danger is twofold, as both the alimentary canal and consequently the entire system are at once menaced. This is principally the case with small infants whose digestive organs, especially in the summer, are so easily upset by raw milk, which is never sterile. The udder of the cow is always more or less soiled with foreign matter, and this constitutes a first cause of contamination, aggravated, indeed, by all the manipulations which the milk undergoes between the farm and the table of the consumer. It is bad enough in cold weather, but the summer heat hastens the development of bacteria; fermentations arise at the expense of the casein and produce ptomains. Thus charged with toxins and microbes, milk becomes the most dangerous source of enteric trouble, the greatest slayer of infants known.

Luckily much has been achieved by disseminating this knowledge among the people at large, and the use of boiled milk becoming more universal every day, infant mortality in the larger cities has been appreciably reduced.

The infection which at first attacks only the digestive tube, is prone to spread and involve the whole organism. Milk may become the

carrier not only of ordinary microbes, but of diphtheria, typhoid, scarlatina, smallpox, and even tuberculosis. It has been proved to satisfaction that the bovine bacillus may become pathogenic for mankind. It has often enough been discovered in milk, and despite the sanitary measures of modern times, inspection of stables, testing of cows with tuberculin, contamination cannot be effectually prevented. The intestines, no matter how sound, may at any time serve as the gate of entrance to the tubercle bacillus. Moreover, medical science has not as yet discovered a means by which the presence of this dreaded bacillus can be discovered in the system, until it has actually attacked an organ. All these facts should assist in discouraging the use of raw milk everywhere.

Sterilization of milk becomes therefore imperative. But how to do it? There are so many methods, and the results are so unequal.

Pasteurization, or heating the milk at a temperature of 160° Fahrenheit for twenty or thirty minutes, is a good method for killing the principal microbes and changes the milk but little. But it requires a special outfit, which is not easy

to master and handle. Besides, the sterilization is not complete, and milk cannot be protected for any length of time by this process.

Scalding the milk at a temperature of 210° Fahrenheit for a few minutes simply suffices to prevent the milk from turning, but it will not destroy all the germs. It would not be advisable to feed it to a tender infant.

The best method we can advocate is to heat the milk to 210° Fahrenheit in a steamer for at least fifteen or twenty minutes. This will insure the destruction of all pathogenic germs. A few yeast spores of casein remain behind, but that is not a matter of any consequence. But in all these methods it is to be emphasized that the milk must be absolutely fresh.

With the heating of milk up to 230° and 240° Fahrenheit for several minutes, we come to industrial undertakings. As all the spores are destroyed, the milk may be kept for weeks and months. A great many varieties of such milk are in the market. Some are sold as in their natural state, others are modified so as to approach the composition of mother's milk.

Recently some one has been singing the praises of homogenized milk. The object of

this preparation is to break up the globules of fat into infinitesimally small particles, with a view to prevent the formation of lumps of butter which are so frequently found on the surface of sterilized milk.

We must, however, add to this list, which is already overlong, *milk powder*, a preparation of a very delicate character, but which seems to have the advantage that it keeps better and longer than any other variety. If its value for infant feeding is debatable, it yet serves a great purpose, especially for explorers and the colonial trade.

For nursing purposes none of the industrial preparations are to be recommended, and we can honestly say that the farther milk is carried from its source of origin, the less it will agree with the infant, not because of the modifications of the casein, or the elimination of the lecithin due to the journey, but by force of the destruction of the ferments. This, perhaps, will supply an explanation why the continued use of sterilized milk has in its train scurvy and Barlow's disease.

Résumé.—*Cow's milk should not be taken raw. Steaming the milk at home for fifteen or twenty minutes is still the best method of sterilization.*

The commercial preparations, harmless to adults, should have added to them, if at all used for infant feeding, a dash of orange-juice or that of the lemon.

It would be futile to refer to the endless uses to which milk is put in the culinary art. Most of them are beyond criticism, some are perhaps a little hard to digest. If you suffer from *arthritis*, do not forget that the addition of a bit of milk singularly increases the nutritive power of certain dishes.

ADULTERATIONS

For the comfort of readers residing in New York City the translator subjoins here, without guaranty, however, for its correctness, an article which appeared in the *New York Times* on July 25, 1910, under the heading of "Topics of the Times:"

MILK IS HIGH, BUT CLEAN

However badly 9 and 10 cent milk may choke New York at thought of the price, there ought to be some consolation in the assurance that at least it is the purest and cleanest milk in the world. That it is clean and pure may, indeed, explain in part, though by no means

altogether, its high price. And, while the milk purveyors as a rule have cooperated cheerfully with the health authorities in maintaining a high standard of milk-supply, the untiring work of the Health Department is at the bottom of the inestimable result.

Dr. Darlington, when Health Commissioner, labored diligently to keep the milk sold here uncontaminated, a task not easy in a territory covering half a dozen States, extending north into Massachusetts and west into Ohio. Commissioner Lederle, as shown by a recent statement of his methods of dairy inspection, has not permitted the work to lag a moment. Not only are samples of practically all the milk brought into the city analyzed daily in the Health Department laboratories, but a keen lookout is kept over the entire city for sectional outbreaks of disease which may be traceable to the milk-supply. Dr. Lederle's statement shows also that the closest practicable reckoning is kept of the thousands of dairies which supply the city. This inspection is maintained by a corps of trained men who visit the dairies at regular and often at irregular intervals. For each dairy a score card is kept by the inspector for the Health Department, and each dairy has its rating. It is 80, 90, or 95 per cent good, as the condition found by the inspector warrant. If it falls below the high standard required its milk cannot come into New York until all objectionable conditions are removed. The fact is, the requirements on the dairies are more exacting in cleanliness of cows and milkers than are usually maintained for private consumption anywhere in this country. The Attorney-General, who has investigated this question, says that the charges for milk are exorbitant. But it's clean and rich, and it is far better

for the people that it is such than if it were not clean, not pure, mixed with water, and possibly dirty water at that, and yet cheap.

A few words here about *cryoscopic analysis,* which seems to render an excellent means for controlling and testing the purity of milk.

Pure milk freezes at 31° Fahrenheit. This is a fixed figure, no matter what the proportion of the different constituents may be or the age of the cow or the fodder given. Every deviation shown by the cryoscopic thermometer points to some adulteration. This process of inspection, which requires a little time, and a small outlay for instruments, deserves the careful attention of every large community, inasmuch as it is of the utmost importance.

REACTIONS

a. *Digestive.*—Of all the foodstuffs, milk is the one which makes the least demand on the digestive glands, and causes them the smallest amount of excitation. Clinical facts and laboratory research agree on this point. Pauloff, above all others, has made a special study of the reaction of milk on the digestive secretions. In the stomach, with an equal amount of albu-

min, milk produces a chlorhydropeptic secretion, inferior to that of meat and much inferior to that of bread. In the duodenum, with the same quantity of fat, the secretion of steapsin is scantier than with meat; with the same quantity of carbohydrates the amylolytic secretion is slightly lower than with bread.

The study of the nitrogenous changes gave this same author the chance to observe at what little expense the digestive process of milk is carried on. A meal of bread produced in a dog, during the subsequent hours, an enormous rise in urinary nitrogen; with a feed of milk, containing the same amount of nitrogen, the rise observed was nearly three times less. The ingestion of nitrogen being the same in both instances, the difference in the rise can only be ascribed to the difference of the digestive labor, considerable in the first instance, a minimum in the second. Moreover, the milk was retained, and in a fashion had an equally beneficial effect on the intestinal flora and on the ferments which it provoked, thus proving its antiseptic and antitoxic qualities. But we must make here a necessary restriction in order to explain the complexity of the clinical facts. This beneficial

influence cannot be exercised unless the digestive functions are normal and the milk is well digested. Under such conditions a milk diet should make the intestinal flora fall from 67,000 to 2,500 c.mm.—(*Gilbert* and *Diminici.*) The change from a meat diet to a milk diet is accompanied by an important diminution of urinary sulphoether. Rapid digestion of casein, antiseptic action of lactic and succinic acids, which are derived from the lactose, such is the double explanation of this phenomenon.

If, *e contra,* the milk is badly digested, if the intestines are already infected, the casein becomes the prey of proteolytic bacilli, and advances their growth and ferments by giving way to powerful toxins. This explains the fact that in numerous cases of enteric trouble, the ingestion of milk is accompanied by aggravated symptoms, which, however, disappear with the removal of the cause.

b. *General.*—The influence of a milk diet on the general system is of the same nature. The absence of stimulation is the principal characteristic Hence the feeling of faintness so often experienced by those who by sickness are reduced to a milk diet. They do not suffer from

the want of calories, but from the want of an excitant.

All the organs are benefited by the quieting action of milk: the nervous system, the liver, and probably also all the glands of the blood-vessels.

In a like manner it affects the heart and the vascular system. Milk is a sedative of the first order. Its poverty in salt, the absence of xanthic substances, the characteristics of its own albumin (one of the least toxic), all aid in this action.

It suppresses the toxins in the circulation, neutralizes vascular construction and defective tension (the natural consequence of the former), and relieves the action of the heart. The ease with which it is digested is favorable to the cardiac functions; every act of digestion must fatigue the heart. With milk this fatigue is reduced to a minimum.

3d. *Eliminating.*—Neither is the influence on the kidneys less profound or favorable. Antitoxic, rich in lactose, poor in salt, milk is an admirable diuretic. It is, indeed, a common case of *Bright's oliguria*, in which a milk diet is able to increase the daily output of urine to 3 or 4 liters.

Sedative and antiseptic for the alimentary

canal, antitoxic and calming for the general system, diuretic for the renal glands, milk lays claim to the title of a therapeutic agent of the first order. But these properties will not be realized unless milk is used when and where it is needed. The absolute milk diet requires certain precautions to which we shall give forthwith proper attention.

ABSOLUTE MILK DIET

The physician should not content himself with simply prescribing a milk diet to his patient, but he must complement his orders with a series of instructions without which good and satisfactory results cannot be obtained. Their object must be to correct the faulty distribution of the alimentary principles in the milk and to insure proper digestion.

1st. In the adult the ideal proportions would be:

Albumin	18.1
Fat	10.4
Carbohydrates	71.5

But the actual proportions in the milk are:

Albumin	28.0
Fat	30.0
Carbohydrates	42.0

Fat, therefore, is too predominant and carbohydrates are wanting.

The former may be remedied by boiling or skimming the milk, especially in liver troubles. The latter may be improved by the addition of either ordinary sugar or of lactose, according to the amount of diuresis which it is intended to produce.

It is also advisable to take with the milk a few dry biscuits (crackers) in almost all cases of illness. This is of practical value, as it gives strength to the patient and reduces the quantity of liquid to be taken.

It requires 3 liters of pure milk to make a proper ration.

$$670 \times 3 = 2{,}010 \text{ calories}$$

If 50 grams of sugar (ten lumps) per liter and 80 grams of dry biscuit (crackers) are added, 2 liters of milk will be sufficient.

$$670 \times 2 + 400 \times 0.80 + 397 = 2{,}057 \text{ calories}$$

These proportions are more ideal and the ration is superior. The addition of thick barley-water or of gruel, in quantities to be regulated by the nature of the disease, will often prove beneficial.

2d. It will happen often enough that the milk is not well tolerated by the patient, producing gastric fermentations, or diarrhea or constipation. This may be the fault of the doctor, who has not taken all the circumstances of the case into proper consideration. The temperature of the milk is an important factor. When once boiled, the milk may be taken either hot, lukewarm, or cold, just as the patient prefers it. We should never forget that the fashion in which milk is preferred by the patient has a strong influence on its digestibility.

To aid digestion, milk should be taken slowly and in small quantities. Without this precaution it is apt to form large floccules and to ferment. There should be an interval between each dose. Two liters of milk should make six to seven doses. If to be taken in six doses, then 350 grams should be administered every three hours; if in seven doses, then 300 grams should be given every two hours, thus leaving seven hours for a night's rest. Each dose should be fed slowly, with a spoon, for a quarter of an hour. The milk should be eaten, not drunk. It should be masticated, chewed, in order to mix it with the salivary secretions so necessary for

the digestion of lactose. This is facilitated by soaking crackers, or bits of bread in the milk.

3d. The disgust or nausea, so easily generated by this insipid and monotonous mess, is another impediment to good digestion, and prevents proper assimilation. The doctor would do wrong if he were to be relentless, or relied too much on the energy of the patient or the insistence of the attendants. He will gain more by allowing a few cups to be seasoned with a few drops of tea, or coffee, or even brandy, if the condition of the patient permits, or to flavor the milk with a trifle of vanilla, or caramel, or orange-blossom, etc.

4th. The greatest obstacle, however, to a successful milk diet is gastric hyperacidity, which quickly coagulates the casein into compact clots and large masses, leaving little, if anything, for digestion. The addition of Vichy or soda water (potash water is preferable) will act as a corrective. Bicarbonate of soda (baking-powder) and lime-water also will modify this acid propensity. Rennet, the virtues of which have in recent years been so much extolled, should, we think, not be used.

5th. As a last precaution we recommend, es-

pecially in cases of *infection* and *cachexia,* that the mouth and the gums be carefully rinsed with a draught of Vichy or soda water. This is the only effective way in which the remaining particles of milk that provoke lactic fermentation and so readily cause the appearance of thrush, can be effectively removed.

For severe, acute attacks of cold in the head, or of grippe or influenza in the incipient stages, the following recipe will prove of decided advantage and comfort:

Half a pint of boiling milk,
One or two lumps of sugar,
One tablespoonful of *dry* gin (London gin).

Stir thoroughly and pump into it two or three generous dashes of soda or potash water from a syphon. Drink hot after going to bed. Cover up well. A copious perspiration will ensue, with a subsequent feeling of relief and extreme comfort.—(*Translator.*)

INDICATIONS AND CONTRAINDICATIONS

Milk as a Food for Infants.—We can only succinctly repeat here the principal rules which govern the nursing of babies; referring the reader for details to the larger text-books.

Nothing, so far as infant feeding is concerned, can excel mother's milk or replace the breast.

We have already on a previous page given the reasons for this statement. The average length of time for suckling is from twelve to fourteen months. Marfan fixes ten to eighteen months as the minimum and maximum period for weaning.

Mixed nursing, in which the breast is alternated with the bottle, is not an equivalent to suckling, although it has certain advantages. The small quantity of mother's milk absorbed by the baby provides the necessary ferments. Should the bottle disagree with the child, it is easy to give it the breast alone for a few days. If the mother has not milk enough, or if suckling fatigues her too much, mixed nursing must of necessity be resorted to.

In some places the babies are put to the nipple of the goat; although the method is superior to bottle-feeding, it cannot often be obtained.

To raise a baby on cow's milk alone is a difficult task, especially in large cities, and requires many precautions. The milk must always be boiled, and at first must be diluted with water and sweetened with sugar, or a spoonful of milk-sugar. The quantity of water must be grad-

ually lessened, and about the eighth month pure milk may be given.

About this time one may begin to give pap, of which we shall speak a little later on. But for a long time milk, which is such excellent nutriment for growth, must take the foremost place in the feeding of the child.

Pyrexia.—Nourishing, easy to digest, alleviating the heart and kidneys, milk presents a good article of food for all acute diseases, and forms the most convenient base for a fever diet. Skimmed milk is very useful in such cases, as it does not burden the stomach for any length of time, being digested rapidly. When sweetened with milk-sugar it proves beneficial in *oliguria,* mixed with brandy in *adynamia,* and with barley-water and gruel in cases of *intense denutrition.*

Gastrointestinal Affections.—The time is not far off when milk will be the foremost remedy for *dyspepsia;* although it does not suit every case, because its sedative reaction and propensity to cause fermentation proves at times objectionable.

In all gastric defects of a serious nature, especially in *cancer,* in all forms of severe excitation,

such as *ulcers* and *hyperchlorhydria*, milk is of great utility. In the latter case particularly, the absolute milk diet should always be advised, as it produces marvelous cures.

Milk must be prohibited in gastrointestinal *atonia*, in severe *dilatation* of the stomach, in *gastritis* and in *gastroenteritis*, in *cancer* with processus inflammatorius, and in certain nervous affections (*nervous vomiting*, *rumination*).

For the rest of the cases a moderate use is not injurious; but it should only be taken with soup or mixed with other eatables. Under no consideration, however, should milk be used as a beverage during the repast, because in this form it retards the process of digestion and favors fermentation. Taken by itself, milk is an antiseptic; but when used as a drink with other foods, it becomes an autotoxin.—(*Pascault.*)

In intestinal therapeutics much reserve must be employed in the use of milk, for whatsoever answers no good purpose easily entails injury. Its quick binding and absorbing qualities make it react, as a rule, favorably in attacks of *diarrhea*, markedly so in cases of chronic diarrhea in hot climates. Nevertheless, meat-juice, and even

raw meat, may here prove more beneficial. In enteric fever in adults, its action is unreliable, being well tolerated by some individuals, but producing fermentation and flatulence in others. Combe,[1] of Lausanne, strenuously opposes the use of milk in any kind of intestinal inflammation. In infants of tender age, enteritis constitutes an absolute contraindication.

It is often quite sufficient to promptly stop the use of milk in order to bring about immediate improvement. Extreme caution must be exercised in resuming the milk diet. It should be accomplished in easy stages and with small doses.

To the constipated, those great eaters with *chronic cecal obstruction*, the use of milk will not readily appeal. In *enterocolitis*, it should constitute a part of the regimen, but in small allowances only.

Affections of the Liver.—At the last Congress of Food and Hygiene the indications were eloquently described by A. Robin. He emphasized the fact that while milk in many cases is most useful, by force of its sedative and quiet-

[1] Combe: "Intestinal Autointoxication," English translation by G. W. States, Rebman Company, New York.

ing effects on the liver, yet the lack of stimulating power may also render it harmful.

The milk diet gives relief in cancer, in the first stages of *cirrhosis, biliary hypertrophic cirrhosis, Laennec's cirrhosis* in its first stage, *hepatitis* indigenous in hot climates, and in *arthritic* enlargement of the liver. In the second stage of cirrhosis a milk diet is too excitant. In *icterus* the use of milk must be stopped as soon as the primary crisis has come to an end.

In *lithiasis* Gilbert recommends skimmed milk in small doses in order to stop migration of the calculi; but after that crisis has passed, milk must be stopped.

Affections of the Heart and the Blood-Vessels. —*Every asystolic* condition invites an absolute milk diet. Huchard has shown its beneficent action in *cardiopathic* conditions of the arteries, in *supertension*, in *arteriosclerosis*, whether it consists of functional disorders or fixed lesions. Although these diseases do not radically yield to a milk diet, yet these cures, undertaken for a few days in each month, wash out the tissues and bring about a toxic correction which can only benefit the general conditions of health.

Nephritis.—As for the heart so for the kid-

neys, milk is an heroic food, being at the same time antitoxic, hypotensive, and diuretic. The researches made recently by Widal and Javal have brought much light into this question. According to these authors, milk acts like an agent charged with hypochlorite, easing the kidney that has become impermeable to chlorids. And as it is not difficult to find other foods even less chlorated than milk (farinaceous foods, pastes, unsalted bread, and even meat) these may advantageously be employed to replace the former in the diet list for *Bright's* disease. These conclusions are of more than passing interest, as it often becomes necessary to change the diet of the patient. Nevertheless, they should not let us lose sight of the special qualities of the lactose and albumin contained in the milk. In acute nephritis and in slight and severe attacks of uremia the milk diet should be rigidly enforced, special precautions being adopted that it is well tolerated. In all cases of dropsy, milk is an important factor in the diet list.

Nervous Affections.—Calming, antitoxic, rich in phosphorus, milk is in all these affections an excellent nutrient, the more strongly indicated

the higher the nervous tension. According to Weir Mitchell it is the only food permissible in the treatment of neurasthenia.

Cancer. Tuberculosis.—Milk is by far the finest food for building and feeding up the constitution. Its use is preeminently indicated in all stages of denutrition, of which these two diseases are prototypes. Many consumptives are able to consume several cups of milk between meals. Of course, this form of superalimentation is not required in patients who are blessed with a strong digestive apparatus.

Arthritis.—The employment of milk in arthritis is one of those delicate questions which cannot be answered with absolute certainty. In some cases it is to be shunned, primarily as a means of excessive nourishment which adds too much force to a diet already too abundant, and the danger always exists that on account of the good reputation it enjoys, the patient is apt to use it too generously. Besides, many persons suffering from arthritis are troubled with an atonic and sluggish alimentary apparatus which is incapable of digesting milk, thus inviting stasis, fermentation, and intestinal congestion. Yet there are patients who respond well to a

generous milk diet enforced during several days. But it must be preceded by a thorough purging.

It is always wise to keep an account of the various clinical facts, viz., beware of *cecal stasis* and of *intestinal fermentation;* bear in mind that milk, wrongfully employed or badly digested, may become the source of serious untoward events.

In *gout* and *lithemia* everything can be gained by a diet absolutely free from all puric substances, but it is proverbially true that the arthritics form a family that disregards all restrictions as to diet with the utmost audacity.

In *oxaluria* milk must be neglected on account of its richness in lime and its poverty in magnesium.—(*Klemperer.*)

Diabetes.—The natural tendency, of course, is to interdict the use of milk because it is too rich in lactose, yet sugar of milk is better tolerated on an average than other forms of carbohydrates, and there are cases on record in which a milk diet lowered the percentage of sugar appreciably. Although we should consider it wrong to particularly recommend a milk diet to diabetic persons, still it is sometimes advisable to fall back upon it. The susceptibility of the

patient should first be tested, and in the face of the many complications that usually accompany this disease, it is, perhaps, just as well not to relinquish at once this ever-valuable aid.

DERIVATIVES OF MILK

Casein and butter are the nutritive constituents of milk, while lactose, lactic acid, and the salts may be looked upon as valuable remedies. The therapeutic value of all the derivatives of which we intend to speak here depend upon the latter qualities.

I. BUTTER-MILK

Albumin.	Fat.	Carbohydrates.	Ash.	Available Calories.
2.6	0.6	3.2	0.74	29

It consists of what is left of the milk after the butter has been churned out of it. This residue has been robbed of its fat and a small portion of casein; but lactose remains, with the exception of a minor amount which has undergone lactic fermentation.

This modification renders it an excellent remedy for gastrointestinal troubles in infants; the absence of fat makes it easier to digest, and ex-

ercises a direct disinfectant action on intestinal putrefaction.

In acute gastroenteritis it may be found more or less superior to soups made of legumes. According to Rivet, buttermilk affects the feces in the same manner as nursing at the breast does. It is also highly spoken of in cases of infantile eczema.—(*Lesne.*)

If 80 or 90 grams of sugar per liter, or a tablespoonful of flour be added and the whole cooked just to the boiling-point over a slow fire, it will make a food almost as nourishing as pure milk.

II. WHEY

True whey is the liquid left after the milk has been coagulated by the aid of rennet, and is nothing but the clear opalescent serum of curdled milk. This is the *sweet whey* as against the *acid* or *cheesy whey* obtained by the addition of tartaric acid. It contains less albumin, hardly any fats, but the whole of the lactose, a portion of which is transformed into lactic acid, and all the salts of milk, with the exception of phosphate of lime, which is eliminated with the casein.

This liquid contains but little nourishment, but possesses highly diuretic and mineralizing qualities. It is also slightly laxative.

Whey-cures are frequently taken in Germany for the purpose of flushing toxic bodies out of the organism in *gout, stone, liver complaints,* and *gastrointestinal* troubles.

The proper amount to be taken should not exceed 500 to 750 c.c., in doses of 150 c.c. at regular intervals in the morning and afternoon.

III. KEPHIR

Albumin.[1]	Fats.	Lactose.	Lactic Acid.	Alcohol.	Ash.	Available Calories.
2.9	3.1	2.9	0.6	0.6	0.65	55

It is obtained by a process of alcoholic and lactic fermentation of cow's milk, or sheep's milk, by the aid of two fermenting agents, i.e., the *saccharomyces mycoderma* and the *dipsora caucasia.* Kephir comes from the Caucasian mountains. Kephir tablets are a commercial article, and can be used in any household, although it is rather difficult to obtain satisfactory results with them at home. Here is the recipe. Boil the milk, take off the cream; fill the bottle three-quarters, add the kephir tablet, cork the

[1] These figures refer to fatty kephir two days old.

bottle tight, and put it in a warm place. It should be shaken every two hours. The amount of alcohol and of lactic acid is increased by protracted fermentation. As a rule, kephir No. 2 is employed, which has fermented for *two* days. Kephir of *one* day's standing is rather laxative, and that of *three* days' very constipating.

Its characteristic properties are: 1, peptonization of a small amount of casein; 2, presence of lactic acid, which acts as an intestinal antiseptic; 3, presence of alcohol and carbonic acid formed from the lactose and acting as stimulants to the process of digestion; 4, an abundance of diastase partly derived from the yeasts.

Reactions of Kephir.—a. On the stomach. It is a food easily digested, as it does not remain in the stomach very long, especially so if it is made of skimmed milk. Experiments made by Gilbert and Chassevant show the following results:

One liter of raw milk remains in the stomach for seven hours.

One liter of skimmed and boiled milk remains in the stomach for five hours.

One liter of fatty kephir No. 2 remains in the stomach for four and one-half hours.

One liter of kephir, made from skimmed milk, No. 2, remains in the stomach for three and one-half hours.

b. It accelerates nutrition, by raising the rate of urea and diminishing the acidity and the amount of uric acid. It is also likely that it aids assimilation, as a number of authorities have observed that kephir makes flesh more rapidly than any other food.

We specially recommend it:

For a number of *gastric* and *intestinal* troubles; for *hypopepsia, chronic gastritis,* and *apepsia* (here it will greatly aid digestion); it will often stop *vomiting* in pregnancy; in cases of *cancer* it often affords great relief.—(*Martinet.*) In *chronic enteritis* and in *dysentery* it is a strong factor in intestinal assimilation. (On account of its richness in acids and alcohol it is harmful in cases of *hyperchlorhydria* and *ulcers.*)

For *consumptives, emaciated, anemic,* and *nervous* persons, in whom the daily losses are not compensated by proper assimilation.

A special point in favor of kephir as a food for *phthisical* patients is its action on the stomach, on the canal, and on nutrition in general, which is clearly antagonistic to the actions of the tubercle poisons. It renders also great services in stimulating a failing appetite and arresting a stubborn loss of flesh. Certain invalids never

begin to pick up till they are put on a diet of kephir.

It is not to be recommended in affections of the *heart*, or the *kidneys*, or the *blood-vessels;* not to patients who have a leaning to *plethora* or *congestion.*

The usual dose is from half a liter to a liter at noon for luncheon, or about four o'clock for a repast. Patients who are on a strict kephir diet should follow the same regimen as those on a strict milk diet, although the doses may be slightly increased because the nutritive coefficient is smaller.

IV. KOUMYS

Albumin.	Fats.	Lactose.	Lactic Acid.	Alcohol.	Ash.	Available Calories.
2.20	2.12	1.53	0.90	1.72	0.29	44

Koumys, formerly prepared only by the Tartars, has gradually found its way westward. It is made of mare's milk with a process of lacto-alcoholic fermentation, similar to that of kephir, though stronger. The technique is pretty well the same, but the germ used differs. The milk is put into bottles five hours after fermentation has set in, which is then allowed to continue

for five to six days. The product is an "emulsified liquid, effervescent, with a sweetish, acidulated taste, reminding the palate of the taste of milk of almonds. It stimulates the appetite, aids digestion, and is slightly intoxicating."—(*Gautier.*)

It differs from kephir by a stronger percentage of alcohol and peptones, and a smaller percentage of salts. Indications and contraindications are for both the same, except that koumys should be taken in smaller doses.

V. YOGHOURT

Curdled milk has been employed during all ages and the whole world over, although it is known under different names in different regions. The curdled milk of Bulgaria or *Yoghourt* contains only two lactic ferments, i.e., a *streptococcus bacillus* and a *streptobacillus* called *Maya.* However, what we are about to say of the curdled milk of Bulgaria refers just as well to any other ordinary curdled milk.

To make yoghourt the milk should be boiled down to three-fourths of its quantity; it should then be cooled off to 112°; the Maya ferment is then added, and the vessel containing the milk

is kept in a temperature of 112° for six to eight hours, when the milk is curdled.

The characteristic qualities of yoghourt are the presence of lactic acid, varying from 10 to 20 grains per liter, and the solubility of a portion of the casein. It acts as an intestinal antiseptic, affects in time the flora of the digestive canal, combats cecal stasis, and lessens fermentation. Metschnikoff, who attributes to these fermentations a preponderating rôle in the economy of the organism, does not hesitate to call curdled milk the elixir of long life. It is useful in *arthritis* and to *heavy eaters* with big abdomens and cecal obstructions, but only on the condition that it is not added to the ordinary diet, but takes the place of other foods, as otherwise it might have very troublesome effects. Ordinary curdled milk offers the same advantages as yoghourt, only, perhaps, in a somewhat slighter degree.

CHEESE

CHEESE, although a product of milk, possesses quite different characteristics. Its dietetic property is almost *nil*, but its food value is great, and plainly justifies the renown in which it has been held at all times.

There are almost as many different kinds of cheese as there are countries where cheese is made; but they may all be classed into three or four groups, according to the different methods of manufacture, and according to the composition and the properties which are, however, almost identical in all.

The manufacture of cheese is pretty well the same everywhere, whether this is accomplished by lactic fermentation or by the aid of vegetable or calf rennet. Coagulation involves the casein, nearly all of the butter, a little of the lactose, and a goodly portion of the phosphate of lime. The acid salts stay almost entirely in the cheese, while the basic salts remain in the form or mold in which the cheese is made, whence is

derived that slight taste of acidity in the rind or crust.

Coagulation, produced by spontaneous lactic fermentation, constitutes the first variety, i.e., *fresh unsalted cheese* (pie-shaped cheese, cream cheese, Gervais, petit Suisse).

The mean composition is:

Albumin.	Fats.	Carbo-hydrates.	Ash.	Available Calories.
10.80	20.70	3.78	2.00	265

They possess nearly the same properties as curdled milk, of which we have already spoken. We will only mention that Gervais is particularly rich in butter, and that the petit Suisse contains a considerable amount of kitchen salt, for which reason it is not suitable for patients suffering from *Bright's* disease.

With these restrictions, unfermented raw cheese however, always on the condition of absolute freshness, may be recommended for moderate use in the sick-room. It should form a part of the milk diet.

In most cheeses coagulation is brought about by the aid of rennet. Some of them pass also through a more or less prolonged process of cooking.

Second variety: *Cooked cheeses* (Emmenthal or Gruyère—ordinarily known in this country as Swiss cheese,—Parmesan). Both are excellent foods.

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Emmenthal...	28.37	28.49	1.43	3.69	400
Parmesan	39.34	18.97	1.95	4.72	357

The percentage of albumin, it will be noticed, is exceptionally high, which renders these two varieties the most nitrogenous foods known. Meat and vegetables are outdistanced. Fats are very abundant, for which reason the food value of the Emmenthal variety, being made of the whole milk, exceeds that of Parmesan in the preparation of which the milk is partly skimmed.

The large amount of salts, chiefly chlorid of sodium, however, detracts a good deal from its value.

These cooked cheeses have a mild, stimulating effect on the stomach and the bowels. They are easily digested, wholly absorbed, and possess the same quality of being readily assimilated as the fats and carbohydrates. On the other hand, on account of the large percentage of ash contained in them, they are prone to produce, when taken in large quantities, acidity in the organ-

ism. Minkowski attributes to this cause the striking prevalence of stone observed in Saxony, where cheese figures so largely in the diet of the inhabitants.

Very nourishing, rich in nitrogen, free from toxic qualities, cheap in price, this variety of cheese is a food of great value, particularly so to the peasant, to tourists, and to troops engaged in field exercises.

In the sick-room it renders good services. It has its proper place in all conditions which require strong nourishment, such as tuberculosis, neurasthenia, convalescence. By its savory, piquant flavor it lends itself charmingly as a means for modifying, in an acceptable and effective manner, the milk diet, except in *Bright's* disease and in *cardiac* affections.

In *dyspepsia*, especially in the *hyposthenic* form, in *enteritis* and in *enterocolitis* the easy assimilation of these cheeses and their peptogenic and antiputrefactive elements render a valuable aid.

The grated cheese sprinkled on pastry and farinaceous foods forming the basis of Combe's regimen,[1] offers the double advantage of cor-

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[1]Combe: "Intestinal Autointoxication," Rebman Company, New York.

recting the insipid taste of these preparations chiefly composed of salt and water, and of supplying the proper proportion of nitrogen and fat.

For *diabetics* they are useful on account of their high alimentary value and the absence of carbohydrates. They are also highly recommended in acetonuria.

In *arthritis* they must be used with caution; their acidity and high alimentary power are here a source of danger. The habit of finishing every meal with a bit of cheese, often enough proves fatal to men of the world. Its use should be confined to a specified amount in the aggregate for each day, and must not be looked upon as a negligible quantity.

Third variety: *Cheeses with an unbaked crust*, whether they be salted, such as Cantal, Cheshire, Canadian, American, Roquefort, Dutch, or unsalted, such as Brie, Bondon, Camembert, Coulommiers, Gorgonzola, Livarot, Mont d'Or, Liederkranz, etc., are subject to the action of certain yeasts, molds, and fungous growths, the nature and intensity of behavior of which vary in each particular brand. Their mean composition is:

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Salted cheeses[1]...	25.00	25.50	4.4	3.87	366
Unsalted cheeses[2].	19.90	23.00	4.3	3.40	323

They range about half-way between the cooked and the fresh (white) cheeses. During the period of maturing they undergo numerous transformations, the more pronounced the more matured the cheese, by which their properties are entirely changed.

Their casein content is partly peptonized and partly transformed with a series of products more or less noxious, such as leucin, tyrosin, amino acids, and ammonia, whence they derive their odors and savory qualities that give each cheese its peculiar taste. Their fats are soluble in alcohol, glycerin, and in fatty volatile acids reenforced with ammonia, and their lactose ferments in lactic acid, alcohol, and carbonic acid.

Thus modified, the cheese preserves the qualities of its peptogenic and assimilable substances, since the diastase secreted by the yeasts seems to continue within the intestines the digestion of casein; but it thereby loses completely its char-

[1] Average of four cheeses quoted.
[2] Average of seven cheeses quoted.

acter of an antifermentative and slightly toxic food.

A moderate slice of these cheeses is beneficial to a normal constitution, and if taken at the end of the principal meal aids digestion. *Tuberculous* and *diabetic* patients can fall back on them with advantage, so long as there are no intestinal, hepatic, or renal complications present.

In *dyspepsia*, *enterocolitis*, *arthritis*, *heart*, and *liver* troubles, and in *Bright's* disease, they must be avoided; likewise in *eczema* and, in fact, in all *diseases of the skin.*

FATS (GREASES)—BUTTER—OIL

ALTHOUGH of different origin, yet these articles should be classed under one heading, because they are all composed of fatty substances. Of albumin, carbohydrates, and mineral bodies there are but minute traces, likewise of the fatty volatile acids. We speak here of the neutral fats which are formed by a mixture in variable proportions of butyrin, margarin, stearin, and olein. These bodies are formed by a union of one molecule of glycerin with three molecules of corresponding acids, i.e., butyric, margaric, etc.

COMPOSITION AND PROPERTIES

	Percentage of Fat.	Available Calories.	Point of Melting.
Mutton fat	83.40	790	108
Beef fat	81.07	773	105
Pork fat	81.85	782	91
Butter	79.50	752	88
Olive-oil	90.00	846	35

a. *Animal Fats.*—These fats, however small in proportion, form an integral part of all the organs. We have seen that, no matter how lean

the meat may be, it contains a certain amount of fat; but it accumulates more richly in the connective tissue around the intestines.

It is formed chiefly in the membranous layers which control rather its digestibility than the point of melting, for which reason the fat of pork and lard is harder to digest than beef and mutton fat.

As a rule, fat is consumed while hot, mixed with the juice of the meat or prepared with various ingredients and condiments which only add to its objectionable features.

b. *Butter.*—This is formed by the union of the fatty globules of the milk. Besides a small percentage of casein, lactose, and certain lactic salts, it contains also a considerable amount of ferments—bacteria which cause it to degenerate quickly and grow rancid, unless kitchen salt is added in sufficient quantities.

In hot weather particularly, butter should be eaten only when quite fresh.

Hot melted butter is very hard to digest, because the water which separates the fat globules has been evaporated, thus rendering the attack on it by the digestive juices much more difficult.—(*Pascault.*)

Brown butter, however, is an exception, because the high temperature under which it is prepared produces a partial separation of the fats from the acids. Although not equally as well digested as the fresh butter, it is preferable to hot butter.

Oleomargarin is an artificial substitute for butter. If carefully manufactured it is not injurious, and if mixed with genuine butter, although impairing the taste somewhat, it does not detract from the digestibility or food value of the butter itself. The laws, especially in the United States, relating to the sale of oleomargarin are stringent and strictly enforced.

c. *Vegetable Butter.*—Under this name many imitations of butter are comprised. They are principally made from the refined oils of the cocoanut. The taste is rather insipid. Among the better classes these preparations are but little known, but the poor people find them economical as well as acceptable, for they are cheap and keep well. Among vegetarians they have found great favor, and in many armies of Europe they are in use on account of the widespread adulteration of lard.

d. *Olive-Oil.*—This is the finest oil for table

use. It is principally composed of olein and margarin with slight traces of stearin. In the southern countries of Europe it takes the place of butter for cooking purposes. Many authorities contend that hot olive-oil does not carry the same disadvantages which are attributable to hot butter, and that dry and crisp fries made in thoroughly heated olive-oil are very easy of digestion.

REACTIONS

a. *Digestive.*—Although the fats escape almost completely the action of the gastric juices, they yet exert an important influence on the digestive powers of the stomach in general, for they diminish the peptic, especially the hydrochloric secretions, and retard the opening of the pylorus and the evacuations of the digested food. But they ferment easily and create irritating acids.

Their action on the intestines is less marked. They provoke there rather pancreatic and biliary secretions, and gently slacken peristalsis. But as in the stomach, here, too, they are subject to fermentation.

b. *General.*—When the fats have once en-

tered the general circulation, they are accumulated in the liver, infiltrating it in a normal physiological manner.

Thence they are gradually distributed throughout the tissues. It is easy, therefore, to understand how an excessive use of fat is able to choke the hepatic parenchyma.

The fats play an important rôle in the process of nutrition, chiefly by their caloriferous power, for one gram of fat gives on an average double the number of calories than one gram of albumin and carbohydrates will produce. If the latter are superior in their action on the muscular system by force of the isoglucoric coefficient, the fats excel them in the struggle against the loss of heat. That is the reason why the inhabitants of cold climates consume such vast amounts of fatty substances. The fats do not only afford much fuel, but they restrict also the waste of energy, and influence the economical principles within the system almost as much as do the ternary bodies. They also furnish, well nigh exclusively, the material for our reserve forces. Excessive alimentation modifies but little the surplus of nitrogen and sugar in the organism, because everything that is not burned

up and consumed is converted into fat or adipose tissue. Hence it is that overfeeding becomes a danger. A surcharge of fat jams the organs, obstructs their movements, makes the circulation sluggish, and prepares the way to physical degeneracy. These dangers are frequently increased by cardiac localization.

c. *Excretory.*—Fat is not discharged from the system in the same manner as water or carbonic acid. When it does not ferment it does not molest the kidneys. But the fatty acids which it produces are more troublesome, as they irritate the skin through which they are eliminated.

INDICATIONS AND CONTRAINDICATIONS

In the normal individual the absorption of fat is the strongest protection against the loss of caloric force. In cold climates a larger amount of it is required, while in the warm countries the need for it is much restricted.

In the temperate zones fatty foods should be used with moderation, especially during the heated term, if gastric troubles are to be forestalled. This precaution is indispensable in patients who require a calorific diet, such as *consumptives* and *diabetics.*

It would appear that fat constitutes an eminent nourishment in acute diseases in which the caloric losses are so enormous; but, unfortunately, in these very conditions it is badly tolerated and is therefore not absorbed, for which reason it has to be eschewed altogether.

In *prolonged chronic fever* cases, however, its use is fully justified.

In *tuberculosis* a diet of fats becomes a necessity, and it is for the physician to find the form most suitable to the individual case: cream, fresh butter, mayonnaise of fat liver, etc. The benefit derived can easily be measured by the increase in the weight of the patient, and by a decrease in the losses of nitrogen and phosphorus. But, while the portions allowed should be generous, excess must be avoided. Much depends on the size of the stomach of the patient. From 100 to 150 grams per day should be sufficient.—(*Laufer.*) If this figure is exceeded, a momentary but too rapid improvement will be obtained, and the gastric troubles and diarrhea that are apt to follow will do more harm than good in the end.

In *diabetes* fats are equally useful, for the patient will draw from them rather than from the

albuminoids his daily ration of nutriment; and in the majority of cases they are well tolerated. Von Noorden fixes the daily ration from 150 to 200 grams. Not only fresh butter and fresh cream, but also meats and fatty fish, with seasonings rich in fat may be requisitioned. Later on we shall see that one of the advantages of vegetables consists in the fact that large quantities are easily tolerated.

In *arthritis* nothing is to be gained by a calorific diet which retards the process of digestion and produces so easily putrefaction in the atonic, sluggish tube. Animal fats must be strictly interdicted, making some allowance of a moderate use of butter and oil. The same holds good for *gout*, and above all in *obesity*, although in the latter case fats should not be feared any more than carbohydrates.

In diseases of the *liver* the use of fat should be limited for fear of overcharging the parenchyma. The limitation is absolute in all diseases of *insufficiency*, in *Laennec's cirrhosis*, and in *hyperhepatic* afflictions.

In *lithiasis* certain fats, by force of their cholagogic action, are great favorites; for instance, olive-oil, especially when taken in

the morning, a spoonful in coffee, or by itself.

Whenever there is a suspension or a decrease of pancreatic fluid an analysis of the feces will show that the fats are badly dissolved and but little absorbed. In all such cases they must be rigidly excluded from the diet.

In *eczema, acne,* and all *skin eruptions,* which are due to bad intestinal functions, all greasy cooking, all fries, all sauces and gravies should be avoided. Fresh butter may be allowed.

Whether *dyspeptics* may partake of fatty substances depends on the conditions presenting themselves in each individual case. In *dilation* with *atony* and *fermentations* they are to be shunned. In *nervous* and *intestinal dyspepsia* they are often badly tolerated; oil, fresh butter and fresh cream in small quantities may be permitted, but hot butter and hot grease should be scratched off the menu. All foods should be merely cooked in water with salt, and seasoned with a little butter and cheese on the plate when on the table.

These precautions refer also to *hyperchlorhydria.* Fresh butter and oil have a sedative effect; the latter, especially, is well tolerated,

and, when taken in quite large quantities, will soothe pain and suffering. A very good recipe for this ailment is a mayonnaise sauce made of olive-oil and the yolk of an egg.

EGGS

Albuminoids....	7.37[1]		
Fats...........	6.20	—Chlorid .	0.046
Carbohydrates...	0.00	—Purin...	0.0
Ash...........	0.53[2]		

Available calories = 90

Eggs have at all times been a staple article of food. Because they are easy to digest they occupy a predominant place on the menus of the sick chamber.

The egg is composed of

Shell........................	7.2
White of egg..................	35.4
Yolk........................	17.4

The average weight is about 60 grams.

The shell consists of lime salts. Certain authorities have advocated that after eating the egg, the best thing to do with the shell is to pound it into a powder and swallow it. This

[1] These figures do not refer to 100 grams or 100 per cent, but only to the composition of eggs, i.e., the average of 60 grams.
[2] That is without the shell.

certainly would be an economical way of supplying the system with lime; but, apart from the fact that intestinal absorption would be rather incomplete, we have grave doubts whether such an ingestion would not be injurious to the canal itself and seriously involve the appendix.

The white of egg is almost wholly composed of albumins, viz.: ovoglobulin and another almost analogous to fibrinogen. Of mineral substances there are only traces, apart from silica, of which there is abundance. The ash is alkaline.

In the yolk fats are predominant: 31.40 per cent as against 16.12 per cent in albuminoids. These are formed of vitalin and nucleo-proteids. The vitalin is soluble in albumin and in lecithin. The nucleo-proteids consist of one part of albumin and another part of strongly phosphorated nuclein, or, more properly speaking, of paranuclein. This difference is not without importance, for the paranucleins do not contain any xanthic bases. Eggs have no action on uric excretions.—(*Fauvel.*) The fats consist of olein, margarin, cholesterin, and lecithin. The latter is present to a large extent, for which reason natural medication with the yolk of egg (of

which one alone may contain as much as two grams of lecithin) is preferable to the use of the artificial lecithins sold by chemists and druggists. This exceptional abundance of phosphorated paranuclein explains the fact that the yolk of egg is one of the bodies richest in organic phosphorus.

Iron is also present to a large extent. It is found in the form of Bunge's hematogen. The ash is acid, owing to the presence of phosphoric acid; but this acidity is more than compensated for by the alkalinity of the white of the egg.

Résumé.—The whole of the egg, white and yolk together, is a food equally rich in fats and in nitrogen, alkalizing, abounding in phosphorus, iron, and silica. The yolk contains more fats than nitrogen, much iron, and a large percentage of phosphorus; only Parmesan cheese and a few rare green vegetables contain more phosphorus. The food value is considerable, reaching as high as 90 calories. An egg is equal to 40 grams of meat and nearly 150 grams of milk.

The yolk of an egg represents 61 calories.

METHODS OF USING AND PREPARING EGGS

Eggs are eaten in a hundred different ways; every country has its own formulas and recipes. In the kitchen, the white as well as the yolk is utilized in the preparation of all kinds of dishes. It is beyond our scope to refer to every one of these, but they are all pretty equally commendable from an hygienic standpoint.

1. The simplest method is to eat the egg without any preparations at all. So long as the egg is quite fresh it is pleasant to consume. In this condition it is easily absorbed by the economy. A raw egg swallowed whole before dinner does not spoil the appetite and slips almost unnoticed into our daily allowance.

Not everybody, however, can eat raw eggs. So the common method of serving eggs is boiled soft in the shell. This is wholesome food, especially when coupled with a few slices of bread and butter or buttered toast. *Arthritic* patients should never forget that two soft-boiled eggs with 60 grams of bread and 5 grams of butter represent 379 calories, i.e., about one-sixth of an average daily allowance of food.

Hard-boiled eggs, the principal components

of cold luncheons, snacks, and picnics, are rather hard to digest, are very filling, and cause thirst; but when sliced and mixed with a salad they very happily enhance the nutritive quotient.

The addition of hot butter in making fried eggs, scrambled eggs, buttered eggs, and omelets, detracts somewhat from their hygienic quality, and they are not too easily tolerated by delicate stomachs.

2. The carbohydrates make the most judicious combinations with eggs, because the two together form an ideal nutriment. An omelet with potatoes, although somewhat hard to digest, makes an excellent dish for the robust stomachs of laboring men. Most appetizing and easy to digest are omelets with preserves. But "omelettes au rhum" and "omelettes soufflées" are too heavy for a delicate digestion.

Meat, ham, and bacon omelets make heavy dishes and require strong digestive organs.

3. Invalids and sick persons tolerate eggs best when mixed with some liquid. They may be beaten up with milk, soup, bouillon, and chocolate, or coffee and milk. Sometimes the yolk only is used. If the white of the egg is also

used the liquid must be allowed to cool off to at least 140°, or the white of the egg will coagulate, which is equally offensive to the eye as it is unpleasant to the palate of the patient.

For some time a mixture of the yolk of the egg, white sugar and water was thought to act as a substitute for mother's milk.

Martini has proposed for nurslings the following formula:

The yolk of one egg........	15	grams
Sugar of milk.............	5	"
Water....................	100	"

But aside from the fact that the mineral substances are not present in their proper proportions, this mixture, if administered for any length of time, will cause flatulency and other gastrointestinal complications.

To be brief, we recommend here two preparations which are worthy of mention.

Mulled eggs or *egg-flip*. Beat up the yolks of two eggs with one ounce of powdered sugar until the mixture whitens; add a glass of hot water, stir lively, and then add one or two teaspoonfuls of brandy. Drink as hot as possible.

The second is more difficult to make. Martinet gives this formula:[1]

First: Mix in an earthen vessel (it is important that no metallic utensil be used) the yolks of five eggs with 60 grams of powdered sugar. Beat this mixture, adding, gradually, a generous wineglassful of muscatel or old sherry.

2. Add a small stick of vanilla, a bit of cinnamon bark, and a small piece of lemon-peel. Put the whole over a slow fire, all the time beating, until it comes almost to a boiling point and quite frothy.

3. Now strain off the vanilla, cinnamon, and lemon-peel. Put the earthen vessel into a stewing-pan, surrounding it with hot water, and, still beating the contents, add slowly and carefully a teaspoonful or two of maraschino until the mixture stiffens. Drink hot with some light cake, biscuits, or crackers.

This concoction is called in France and Italy zabaglione, in France also sabayon. If prepared according to the directions given above, it consists approximately of 20 grams of albumin, 30 grams of fat, 70 grams of carbohydrates, 22

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[1] A. Martinet: "Les aliments usuels," 1909.

grams of alcohol, and gives about 800 calories (1 liter of milk giving about 670 calories).

4. The digestibility of cakes and of side dishes, and their nutritive qualities, depend largely on the quantity of eggs used in their composition.

The white of egg, beaten or whipped into froth or "snow," is largely used in pastry cooking. Later on we will discuss the possible dangers that lurk in this preparation.

CHANGES

Eggs, like meat, fish, and all other nitrogenous foodstuffs, spoil quickly. This defection, of course, strongly affects their quality. Candling is not a sure means for determining their freshness. The best way to find out whether an egg is new-laid or not is by plunging it into cold water. If fresh it will lie flat on its side (or horizontally) in the water; if eight days old it will rise at an angle of 45°; if three weeks old at an angle of 75°; if a month old it will stand upright; if older it rises to the surface.

Rotten eggs are easily detected by their internal appearance and their odor, which is due to the presence of sulphurous hydrogen. Microbes easily pass through the porous shell and

impregnate the albumin with dangerous poisons, which successfully defy the sense of vision and smell.

It is well to bear in mind the many cases of ptomain-poisoning caused by eating éclairs, cream-puffs, and similar articles purchased of confectioners. By far the larger part of confectionery bought in the ordinary pastry-shops contains the white of eggs the age of which is very doubtful, and cream cannot be improved by cooking, because the ptomains are not destroyed by heat. Heat, indeed, develops ptomains, a fact which is clearly demonstrated by the frequency of ptomain-poisoning in the summer months. The only effective way to prevent and escape these dangers is really to abstain altogether from confectionery purchased from the makers, at any rate during the heated term.

REACTIONS

a. *Digestive.*—Eggs are easily digested. They put but little strain on the action of the stomach, as they remain only a short time in it, if soft-boiled at the utmost from one to two hours, the minimum length of time in the case of any solid

food; but from two to three hours, if hard boiled or in the shape of omelets.

The absorption by the bowels is also complete, i.e., 97 per cent of the albumin and 95 per cent of the fats. But little residue is left behind. Eggs give off a great deal of heat, and ferment easily, but not as readily as meat.

Certain infants, arthritic by heredity, present veritable idiosyncrasies as regards the yolk of eggs. This condition, however, generally disappears with age. We had a child of five years of age under observation which could not support more than 7 or 8 drops. If a larger dose was given, diarrhea and violent vomiting would set in.

b. *General.*—The action of eggs on the liver has given rise to endless discussion, and seems to be governed by the amount consumed. If in small quantities, the action on the biliary tract seems to be favorable. Experiments made by Brun with the yolk on animals have proved the maximum of biliary excretions. The so-called danger of cholesterin precipitating calculi does not exist in reality, because alimentary cholesterin is not eliminated through the bile. Dufourt injected as much as 4 grams of cholesterin

in the stomach of a dog, but could find no difference in the quantity of biliary cholesterin.

If large quantities are eaten, eggs may become injurious, as the liver becomes surcharged not only with nitrogenous bodies, but also with fat and lecithin. Chemical analysis of *foies gras* shows how quickly lecithin is accumulated in the liver.

The nervous system derives from the lecithin of eggs, which is rich in phosphorus, a marked stimulus, perhaps even rather exaggerated.

Nutrition, of course, is strongly influenced by lecithin. Many experimenters have studied its action on the organism, and all have obtained the same results. Lecithin moderates absorption and diminishes oxidation.

It is also an aid to assimilation, it regulates the reserve of nitrogen and phosphorus, and distributes throughout the economy an albumin which is rich in phosphorus and possesses powerful resisting qualities. All this again depends on the amount consumed, as has been shown by Robin and Binet. With six eggs per day one can observe how the metabolism in consumptives is diminished, i.e., the output of carbonic

acid as well as that of oxygen. But with a dozen eggs per day it is raised, carbonic acid and oxygen both being increased.

c. *Renal.*—In former days eggs were forbidden in albuminuria. The blame was laid on the white of the egg. Experiments, however, made under more favorable conditions have corrected this error. Certain patients suffering from *Bright's* disease can eat as many as ten eggs a day without the slightest modification of the albuminuria, whilst in others there is a diminution. Nevertheless, the influence on the renal functions is not altogether favorable. If the albumin is light and a little toxic, it is apt to provoke fermentation. On the other hand, lecithin contains, in its molecular composition, a given amount of neurin which possesses toxic qualities.

INDICATIONS AND CONTRAINDICATIONS

The egg is preeminently a food for growth and physical development. Under this title it constitutes for the infant one of the most valuable resources, and should take an important place in the list of infant feeding immediately the baby has been weaned. Note, however,

that in *hereditary arthritis* the bowels must be carefully watched. Eggs are appropriate food in *rickets, anemia, diminished mineral metabolism,* where phosphorus, potash, iron, and silica are wanted. Milk supplies the necessary amount of lime which is wanting in the egg.

In *dyspepsia* and *hyperchlorhydria* it does good service. Its presence affords but feeble secretion and fixes a large amount of free acid. Patients who are troubled with crises of lingering pains will derive much soothing effect from swallowing a fresh raw egg. In *dyspepsia* from insufficiency, in *atony* and *dilatation,* eggs should be touched with the utmost caution, if at all. They should be taken in very small quantities only, and never with hot butter. The sulphur in the yolk quickly undergoes putrefaction when the gastric juices are deficient.

In *intestinal* troubles and *laxness* of the bowels eggs are well tolerated. In all cases of common or *specific diarrhea, summer complaint,* and *dysentery,* soft-boiled eggs are wholesome food, likewise in *enterocolitis. Constipated* persons will find them troublesome, as they ferment too easily.

In *Bright's* disease or *cardiac* affections they

may be taken either in the shell or in the shape of side dishes; but the stomach, often so very sluggish in these cases, may claim the same precautions as in dyspepsia from insufficiency.

Finally, the egg is a food for reconstituting the system. It limits the losses in the economy and adds the fixation of nitrogen and phosphorus, wherein consist its great merits. It ought to be a dish of predilection to all who get easily overheated and who have weak powers of assimilation. In *cancer*, *neurasthenia*, and *phosphaturia* the large content of phosphorus shows its proper place. Likewise in *diabetes*, in all forms of *emaciation* and *consumption*, and in *anemia;* in the latter case on account of the heavy percentage of iron present. To *convalescents* who need remineralization eggs should be recommended.

Tuberculous patients should eat eggs, especially the yolk, in large quantities, for unto them they are not only a food but a medicament, indeed.[1] To facilitate tolerance one has to have recourse frequently to all sorts of artifices: A

[1] Recent experiments made by Calmette into the lecithinophilic properties of the tubercle bacillus establish a new argument in favor of the employment of the yoke of the egg in tuberculosis.

new-laid egg sucked before dinner; the yolk beaten up in cacao, or in beef-tea, milk, or claret, also in beer, sabayon, etc.

But care must be had not to sin by excess. If certain patients have attempted to cure themselves by eating eighteen eggs a day, we consider such an undertaking fraught with many dangers. Six per day is considered the best average by Robin and Binet. Moreover, there should be intervals of rest from time to time.

Arthritic patients should make moderate use of eggs, one at a time only. Monteuuis very tritely says: "The egg holds the first place among the aliments for overfeeding."

In *gout,* eggs are useful because they contain no uric acid—in fact they assist in the elimination of paranucleins by the aid of thymic acid.

In liver complaints no special directions, either one way or the other, are required. We have already mentioned that the cholesterin of the egg does not affect gall-stones.

CEREALS

WITH the cereals we pass from the animal into the vegetable kingdom, which alone can truly furnish us with energy, because it alone can utilize the solar heat for the purposes of re-building the organic structures with mineral substances, the combustion of which develops the calories necessary for our existence. The energy which we draw from the animal king-dom is, after all, only borrowed from the vege-table kingdom and simply reaches us in an indirect way. No wonder then that the vege-tables occupy such an important if not unique position in our food list. If we consider the calorific, the nitrogenous, and the mineral values of our foodstuffs, we shall find that at least two-thirds of each of them are derived from the plants, and if the proportion of fats is smaller, this is outweighed by 90 per cent when carbohy-drates come into consideration.

Among the vegetable foods, the cereals easily are in the front rank, and it is quite useless to

expatiate on the importance of a class of nutrients which comprises bread and rice, staple articles that have served humanity as the pillars of nourishment from time immemorial.

GENERAL CHARACTERISTICS

The composition in all of them is of a similar character, the differences being very insignificant, for which reason they can be all classified under certain properties which are common to them all.

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Barley........	10.77	0.67	68.66	1.54	335.0
Oats..........	12.37[1]	6.03	65.77	1.36[1]	380.0
Rice (unground)	7.19[2]	1.76	72.59	0.89[2]	349.5
Maize	7.17	3.04	70.41	1.03	348.0
Rye	7.71	1.23	73.47	0.83	346.0
Buckwheat.....	5.90	1.30	74.34	0.80	342.0
Wheat........	10.12	1.00	72.73	0.43	352.0

The carbohydrates come to the front and, as is the case with vegetables generally, outstrip the element of fat or nitrogen. Neither is any other part so largely represented elsewhere as in the cereals and their derivatives. The carbohydrates are principally present in the form

[1] Purins = 0.06. [2] Purins = 0.

of starch, which is contained in the grain and varies in form and coarseness according to the quality of the flour.

The albumin, though smaller in percentage, differs materially in its composition from the animal albumin. It imposes a much heavier task on the digestive ferments and is much harder to absorb. If the coefficient of nitrogenous intestinal utilization is about 96 for the meat, it is only about 80 for the cereals.

The nuclein exists only in the skin of the grain, that is, in the bran. Flour well bolted contains merely traces of it, if we except oatmeal. Cereals do not belong to that class of foods which generate uric acid.

The percentage of fats is very small, but the contents of lecithin claims attention.

The mineral bases are well represented, the cereals furnishing more than one-fifth of our daily ration of mineral matter. Potash and phosphorus are predominant; magnesium is, as a rule, quite abundant, often exceeding the percentage of lime; iron exceeds in rye and barley, but the amount of sodium chlorid is very small.

Like all vegetable matters, the cereals contain cellulose, which serves as a wrapper for the

nutritive bodies. It is very much reduced, however, in the process of grounding and bolting. The little of it that remains in the flour resists almost completely the attacks of the digestive juices.

On account of the small amount of water present the nutritive value is high; neither does the insufficiency of intestinal absorption affect this to any extent. But the method of preparation modifies it largely. It will be easily understood that, while bread is one of our most substantial foods, a soup or broth made of oats, for instance, is such in a much lesser degree.

The methods of preparation vary a great deal. Sometimes the grain is only decorticated, like rice, or oatmeal, or pearl-barley, in which shape they are used for making soups, puddings, and all kinds of side dishes; or they are crushed into a coarse flour from which soft foods are made, such as cream of rice, gruel, and groats; or they are turned by an elaborate process into a fine meal for making bread and pastry. All these different preparations are well tolerated by the stomach, as well as by the intestinal canal.

Bread will receive particular attention later on.

The reactions of the cereals are almost exclusively due to amylaceous bodies and to lecithin. They pass through the stomach almost without calling into service the secretory process; the starch succumbs simply to the action of the saliva. The albumin, it is true, is harder to digest; but on account of the ternary bodies there is but a small proportion present. Moreover, farinaceous foods seem to have a wholesome influence on the glandular and muscular activity of the stomach. Beauvy found from the examination of the vomitings of nurslings that the addition of farinaceous foods makes a finer and more granular coagulum in the milk.

In the bowels, however, the action is more pronounced, and requires a surfeit of pancreatic secretion. Slowly absorbed and assimilated throughout the length of the intestinal tube, the cereals are really a food for intestinal digestion, as meats are a food for gastric digestion. They act as antiseptics. Combe has thrown much light on this subject in his farinaceous regimens, and his contentions are upheld by a number of authorities. Physical rather than chemical laws are very likely the underlying

principles. Carbohydrates prevent putrefaction; hence it happens that in the lacto-farinaceous regimen of Combe their presence retards the absorption of lactose and facilitates the production of lactic acid all along the intestinal canal.

Nutrition is influenced in a parallel sense by the carbohydrates on the one hand, and by the lecithins on the other, both being elements of economy, since they restrain notably the disassimilation of nitrogen. The stimulating power of the cereals is very limited, as they give off their calories gradually, quite in proportion to our needs. On account of the sugar which makes them digestible, they are suitable for manual labor and physical exercise.

The action on the kidneys is very light, because there is so little of albumin, and xanthic bases are absent; and also because the ternary bodies are burned up in the water and carbonic acid. Achard and Paisseau have demonstrated that a regimen rich in carbohydrates facilitates the elimination of chlorids and diminishes retention.

There are certain indications and contraindications which are common to all the cereals in general, to which we will refer now. The par-

ticular qualities belonging to each will be given in separate paragraphs.

There is no need for going into details on the question of food value for the normal individual, as this is self-evident. The health and physical endurance of the peoples who live almost exclusively, or at any rate to a great extent, on rice, as they do in Asia, or on maize, as in Italy, or on oatmeal, as in Ireland and Scotland, bear eloquent testimony to their quality of being an ideal food for all who are engaged in muscular occupations. Their market price is reasonable, and the demand which they make on the action of the stomach is slight.

In digestive troubles they are well tolerated. *Dyspeptics* can well support them so long as they are decorticated and served in an appropriate form. Not less useful, as Combe has proved to satisfaction, are they found in intestinal troubles, but relaxing or constipating cereals should be chosen according to individual propensities.

These same digestive qualities and the absence of toxic matter point to them also in *cardiac* and in *Bright's* disease. The relative abundance of lecithin and phosphorus render

them worthy of consideration as a food for building up weakened constitutions, and for the period of growth and physical development. Hence they are suitable for *convalescents* and *consumptives*—especially the varieties that are highly mineralized.

For young people who are slow in developing (Springer), nursing women, and in fevers with demineralization, cereals that are rich in lecithin and nuclein should be freely prescribed. Dishes made of the whole grain are preferable.

Martinet gives the following directions: One table-spoonful each of wheat, rye, oats, barley, and bran.

Roast slowly in the oven or in an iron dish; grind in a coffee-mill and form into a pulp in a mortar; add one liter of water, boil down to about one-half (at least two hours required); squeeze through a bolting cloth and add enough water to make one liter of fluid. Keep in a bottle previously rinsed with boiling water. It should be kept in a cool place, or in the ice-box. In the summer months it should be made afresh every day; in the winter every other day.

For *children* the use of cereals is common

property. We will refer to this matter again later on (page 226).

Only in *diabetes*, however, are serious contra-indications observed. Yet there are no absolute rules. Von Noorden even goes so far as to recommend oatmeal. The tolerance of carbohydrates in diabetics is a complex question. Recent research has established the fact that sugar may be used to more or less advantage, likewise starch and the plants from which it is derived.

Labbé has proposed a classification of starches according to their tolerance by diabetics. The downward scale recommended is figured out thus: potatoes, rice, barley, oats, wheat, vegetables. But there is nothing definite in all this. It after all depends on personal idiosyncrasies. Moreover, the tolerance even changes almost every moment in the same individual. The question can only be decided by frequent analysis of the urine, which gives the proper indications for the use of foods applicable to the occasion.

SPECIAL CHARACTERISTICS

BARLEY

Barley is rich in minerals and easy of digestion. The percentage of phosphorus is only exceeded in the not fatty fishes, the yolk of the egg, cheese, cabbage, spinach, and beans; that of magnesium only in the carrot. Lime is very scant, for which reason it agrees with patients suffering from *oxaluria.* It is rather laxative, on account of the large content of cellulose.

Barley flour is used for infants, by convalescents, and tuberculous and demineralized persons. It is also claimed to be of exceptional value in the diet of prize-fighters.

Pearl-barley is less nourishing than the article hulled by machinery, and again the latter less than barley decorticated by hand.

Barley-water has ever been highly prized as a beverage for fever patients. A decoction of unstrained barley—or a full tisane—formed the meager diet (diæta tenuis) of Hippocrates. When strained, however, it makes the rigidly meager diet (diæta exacte tenuis).

In all fevers and in all cases in which the stomach is very irritable—for instance, in *peri-*

tonitis, dysentery, typhoid-fever, etc.—barley-water is the drink which is the best tolerated and offers the most advantages.

Meunier recommends to *dyspeptics,* who must take their beverages hot, an infusion of sprouted barley as very nutritious and easy of digestion, by reason of the diastase which it establishes.

OATS

This cereal is rich in fats and lecithins. It is rather laxative, but at the same time stimulating. Porridge is a common dish in Ireland, Scotland, England, and in the States. It is an excellent food for the tuberculous and for all persons who have to fight against emaciation.

In the Orient it is used for fattening up the young girls during the period of pubescence.

Von Noorden makes his diabetic patients eat large portions of oatmeal well mixed with butter and vegetable albumin. The tolerance of carbohydrates is often enhanced thereby, but the results are by no means always the same. Oat-water is made in the same manner as barley-water, but is not in common use as much as the latter.

RICE

No other foodstuff is of the same superb service to the human race as rice. It forms not only the predominant, but almost the exclusive nourishment among the peoples of the East. If we may be permitted to draw a lesson of dietetic feeding from war, we may at once claim that the Russo-Japanese War was the triumph of rice over rye

However, it is not wise to be too enthusiastic, as there are also drawbacks. Rice is by no means a complete food; it is too rich in carbohydrates, and too poor in nitrogen and fats. If we were to meet our needs for nitrogen by the use of rice alone, the quantity required would be quite excessive and far beyond the physiological ration; and if we sought to find the necessary number of calories, the ration would be notoriously deficient in nitrogen. But there are no people who content themselves with the use of rice alone; meat and fish are also consumed. The Japanese soldier received during the war each day 500 grams of meat or about 300 grams of salted fish.

Rice is the poorest in albumin of all the cere-

als. Rübner, in his experiments with adults, could not prevent a loss of a minimum of 90 grams per diem, which was the equivalent of the rice absorbed. This poverty in albumin is one of the reasons why rice is inferior to wheat. Rice—we speak here of the shelled article—contains only about half the amount of phosphorus and lime than white bread; the percentage of magnesium is slightly lower, while that of iron is a little higher. The percentage of potassium is six times higher than in the other cereals. That is the reason why the races that live on rice consume less salt, in spite of the fact that rice contains only small traces of sodium chlorid.

Rice, on the other hand, is superior to bread in its content of cellulose, which struggles with constipation and maintains the intestinal tone so closely allied to the tone of vitality. But then this is one advantage which would not affect the European races, were they inclined to adopt rice as their only staple food. Our intestines, civilized, badly worn and badly trained as they are, would not know how to master such a mass of residue.

Nevertheless, no matter what the relative values of bread and rice are, rice is an excellent

food; and we cannot too strongly advise its use by the sick as well as the healthy. It is easy to digest and—a very valuable quality—well tolerated in *hyperchlorhydria*. In attacks of diarrhea it renders excellent service, whether it be taken whole or in the shape of rice-water—very likely because it acts rather as an antiseptic than a binding agent.

If consumed in large quantities it may fatigue the digestive apparatus and cause constipation.

Klemperer recommends it in cases of *oxaluria*, on account of its low percentage of lime and its abundance of magnesium.

The form in which it is easiest digested is when boiled to a point, not too much and not too little. In the process of cooking the starch is puffed out and partly converted into dextrin. The alimentary value is, of course, diminished proportionately. One hundred grams of raw gives about 300 grams of cooked rice.

When boiled in water with some kitchen salt alone, it is insipid and can only be eaten in small quantities. With fat, or in soup, it appeals more to the palate. But cooked with milk, it makes one of the best of culinary products, because the deficiency in albumin

and fats is thus thoroughly compensated. Rice pudding offers the same advantages; it is appetizing, nutritious, easy to digest, and for that reason useful to persons with a capricious stomach.

The Orientals eat rice without the addition of other foodstuffs, but they know how to season the taste with a variety of spices.

MAIZE—CORN

This is the wheat of the people living in the southeastern section of France, in the northern parts of Italy, in the Tyrol, in Roumania, and in certain sections of Hungary. [It is used largely in the United States as sweet or sugar corn, and, especially in the Southern States, for making corn-bread and corn-cakes. Under the name of hominy it is well known as a breakfast-food. In Italy "polenta" is eaten with grated cheese.—*Translator.*]

Maize is rich in fats and cellulose, but poor in albumin. It is a very nutritious food; but, unless eaten fresh from the cob, demands a robust stomach.

Mineral substances, with the exception of magnesium, are absent.

[Pellagra, a disease endemic among the maize-eating races, running parallel, it seems, with beri-beri among the rice-eating nations, has recently been made the subject of research by many medical authorities. As in beri-beri, its causes and origin are as yet but imperfectly understood, for which reason remedial and preventive measures are still lacking. The governments of several countries are now, however, taking an active interest in this important question, and satisfactory results may soon be expected.—*Translator.*] The bran of maize appears to be strongly impregnated with toxic matter, which accounts for the fact that corn-meal is less dangerous. Balf recommends that corn-flour, used for consumptives, should be quite fresh, as the toxins develop rapidly with the age of the flour.

RYE

The black bread made from it is eaten chiefly by the inhabitants of poorer districts. Lime, iron, and cellulose are its characteristic elements, all of which should prove valuable in the treatment of constipation. The bolted flour makes the ordinary rye-bread. When

unbolted, the product is called "pumpernickel" by the Germans. Both kinds are hard to digest, and from this point of view inferior to the white bread which is made from wheat.

Rye is often tainted by a parasite, the claviceps purpurea, or ergot, of rye. This is a poisonous substance and often gives rise to epidemics, the symptoms of which strongly resemble those of ergotin-poisoning, and are strongly marked by gangrene of the extremities.

BUCKWHEAT

This is also called "black wheat" in Normandy and the Bretagne, where it is extensively cultivated and baked into cakes known as "galettes," which keep for a long time. It is a heavy food and hard to digest. [Buckwheat cakes are a favorite breakfast dish in the United States.—*Translator.*]

WHEAT

We have reserved this to the last on account of its special dietetic importance. Its food value is only second to that of oats. Unfortunately it is not so rich in mineral substances.

The flour made from wheat is hardly ever used by itself as a food. But the products into which it enters, such as bread, biscuits, pastry, pastes, etc., are of vital interest to everybody.

BREAD

To the white races bread is the staff of life, the staple food indispensable for their daily rations. It represents at least two-thirds of the alimentation of the poorer classes. When a foodstuff like bread has once assumed such an important position in the diet of nations, the slightest modification which it undergoes will have a very intimate effect, either good or evil, on the public health and welfare of the community.

The manufacture of flour, as well as that of bread, has, during the past century, undergone many improvements; but whether they offer ground for approval or regret remains to be seen.

In days gone by, the flour used for making bread was ground between millstones, but in modern times metal cylinders are employed which crush the very heart out of the grain. The sifting and bolting of the flour consist in the removal of the husk or skin of the grain, which is called bran, and gives the flour a dark

or blackish appearance. A 10 per cent bolting still leaves a goodly amount of this impurity in the flour. The best white varieties are subject to 30 per cent of bolting.

To make home-made bread, flour is mixed with water and a small amount of kitchen salt, to which is added a proportionate amount of yeast or leaven. This mixture is allowed to stand, generally overnight, and to rise. In the morning the dough is kneaded, formed into loaves, and then baked in the oven, where it assumes its characteristic golden yellow appearance.

The product represents about 100 per cent, i.e., 100 pounds of flour will make about 100 pounds of bread.

COMPOSITION AND ALIMENTARY VALUE

Albumin......	6.94		
Fats	0.95—	Chlorid...	0.65
Carbohydrates .	52.69—	Purins....	0.00 [1]
Ash..........	0.79		

Available calories = 255

These figures refer to bread of medium whiteness. Nitrogen is formed of the gluten or

[1] Whole-meal bread contains about 0.04 per cent.

gluten casein, a true vegetable casein which swells in water. It is accompanied by cerealin, a vegetable pepsin, which possesses the property of peptonizing the nitrogenous matter. The fats consist chiefly of phosphorated lecithin. Nearly the whole of the phosphoric content exists in this form, if not in the form of diphosphoric methylic acid.

Starch is the essential and truly nutritive element of bread. The percentage varies considerably, but oscillates between 40 and 60, and is dependent on the manner of making the bread. In the beginning it undergoes, partially at least, carbonic fermentation. The gas permeates the dough and makes it light. During the baking the starch of the crumb is transformed into starchy paste, and fixed or united with the gluten. In the skin of the crust the heat of the oven produces an ample amount of dextrin with partial caramelization.

Among the mineral constituents phosphorus prevails, chiefly in the organic form. Potassium and magnesium are well represented. The ash is acid, by reason of the predominance of phosphoric acid.

Since bread is nearly wholly absorbed by the economy, its nutritive value is high; it ranks after the legumes (peas, lentils) and cheese, but precedes meat and potatoes. The alimentary value of the crust is sensibly higher than that of the crumb, because it contains less water (25 per cent as against 45 per cent in the latter). That is the reason why it is better to make loaves oblong, for they represent a larger amount of crust. A round loaf of bread, weighing one pound, contains 39 per cent of water; but a long loaf, weighing a pound and a half, only 33 per cent. *Stale* bread is also a little less hydrated, although its peculiar qualities do not depend on this condition, because, when warmed up, it resumes almost entirely the characteristics of newly made, fresh bread, in spite of the fact that the reheating process still further assists in the evaporation of water.

When bread is eaten together with other articles of food its alimentary powers are considerably increased. We wish to emphasize here, however, that among the numerous devices employed in the household, there are only two which appeal to us as particularly judicious, the first is the spreading of butter on the

bread, because in this wise the necessary amount of fat is added; and secondly, the use of cheese with bread, which raises the standard of both the fats and nitrogen very appreciably.

REACTIONS

a. *Digestive.*—The action of bread on the *stomach* is rather complex. To be properly understood, it must be considered by itself. Gluten, like all vegetable albumins, is hard to digest, and provokes a very strong peptic secretion, four times as strong as that of milk or meat.—(*Chigin.*) But it is small in quantity, while the starch, which is the predominant factor, escapes the action of the gastric juices and comes under the influence of ptyalin; that is to say, on the condition that the rate of hydrochloric acid present is low.

The constituents of bread are changed but little in the stomach, if the physical conditions in which it enters do not paralyze the action of the salivary ferments and peptonic juices. When taken in overlarge quantities, or when it is insufficiently chewed and masticated, it forms a compact spongy mass, difficult to break up, and which quickly ferments. This explains

the fact that dyspeptic persons often cannot tolerate it, and that it is prone to aggravate digestive troubles. To prevent both these pathological conditions, it is quite sufficient to turn the bread into pulled bread or into dry toast.

In the intestines the process of digestion is accelerated, and it reaches there its final stage. Fortunately, the percentage of nitrogen is low. Among the albumins, gluten requires the largest amount of tryptic ferment. It is different with the hydrocarbonic element. The starch of the bread yields to the amylolytic secretion in its weakest form.

The absorption of albumin by the bowels reaches only 79 per cent, while that of the starch goes up to as high as 99 per cent. On the whole, bread leaves but little residue, and that is the reason why it is claimed by many to favor constipation.

In a previous chapter (page 110) we have seen that the percentage of nitrogen being equal, the effort required to digest bread by far exceeds that of milk; but this can have reference only to the nitrogenous content. When we take the amylolytic ferments into consideration, we find that the starch, which is, after all, the

real nutrient element of bread, is digested at very small expense of physical force. This brings us to the conclusion that bread, although a good purveyor of carbohydrates, is a poor provider of nitrogen.

b. *General.*—Short of nuclein as well as nitrogen, bread exerts only a small, albeit benign, stimulating power over nutrition in general and the organism in particular; powerful as an element, it gives off its calories only in proportion to our needs, without provoking an artificial stimulation, which would in any case be followed by a wave of depression.

For all that, it is acidiferous. Gautier has made this clear by proving the predominance of phosphoric acid in the ash.

c. *Eliminatory.*—Unless it ferments within the tube, bread leaves but small traces of excretion behind, consisting chiefly of water and carbonic acid. If properly digested, it imposes only a very light task upon the kidneys.

INDICATIONS AND CONTRAINDICATIONS

Bread is for all, hale or ailing, the fundamental element of alimentation. From the physiological standpoint the man who performs manual labor requires a large quantity of it. So far as pathological conditions are concerned, we know of no disease in which the use of bread is especially indicated; but there are such in which, by retaliation, as it were, it is badly tolerated and may even prove harmful.

Of course, the first place is claimed here by the gastric affections. Nowadays a number of stomachs have forgotten how to digest bread. Surcharging the canal with bread produces putrefaction, and lays the foundation for the numerous cases of *dyspepsia* in heavy eaters and in individuals who force the food down in a hurry, swallowing it without proper mastication. Frequently it is quite sufficient to cut down the daily ration of bread and allow it only in the shape of toast, to see most of the symptoms vanish as if by magic.

In *hyperchlorhydria* it is borne with small success; for the salivary ferments are clogged in the superacidity of the gastric juices, and the

starch, remaining undigested, quickly undergoes putrefaction. All starchy foods—and bread belongs to them—should be permitted in small quantities only. The same must be observed in dilatation and in stenosis. In other forms the idiosyncrasy of each patient should be the guiding line.

As a general rule fresh bread is harder to digest than the stale and seasoned article, as it offers a more stubborn resistance to the attacks of the gastric juices. This refers to hot bread even with stronger force. In like manner the crust is easier to digest than the crumb, as we have already pointed out. The physician will know when to recommend toast, or crackers, or "zwieback."

For *intestinal* affections a great deal of caution is needed, and it is often advisable to lay down strict rules, especially in cases of constipation.

Diabetics should scratch bread almost entirely from their menu. But to overcome this hardship, which may seriously impair the appetite, bread deprived of its carbohydrates and enriched with albumin may be easily obtained in the market. Among the most serviceable we

may mention "gluten bread," which contains only from 10 to 30 per cent of carbohydrates, and also "almond bread."

In *arthritis* the daily ration must be strictly limited, so much the more as the patients frequently have a great liking for bread.

For *overfeeding*, bread is an important factor, but all the same it is a source of *stasis*, *intestinal putrefaction*, and *humoral acidity.* An average allowance of 250 grams (half a pound) per day should be ample; the rest of the diet might be supplemented with potatoes boiled in water, which have the advantage of being less nutritious, slightly laxative, and alkalin withal. In *gout* a similar diet is counseled.

VALUE OF WHITE BREAD

So far we have spoken of the ordinary white bread made of the best and finest wheat flour, such as may be found everywhere nowadays in cities as well as in the country. We will now consider in how far and under what conditions it is a superior food to the coarse bread made in former days.

The difference in its manufacture is twofold: 1. The flour is ground between steel cylinders instead of stone; 2, a more careful sifting makes it whiter. The result of these two manipulations is a more thorough expulsion of the bran, and therefore a finer quality of flour. If we are to speak of the effect this has on the calories alone, we shall find it very favorable. If the content of nitrogen is somewhat reduced by this method, starch in the bread is increased and intestinal absorption is facilitated. In the white bread the power of absorption rises to 95 per cent; while in the cruder forms made of the whole grain, it is only 90 per cent. So far as appearance is concerned, this is a matter of secondary consideration. But it is necessary

to increase the average of the daily ration by 5 per cent, in order to compensate for the losses. Yet from another rather problematical standpoint, the white bread has two decided disadvantages.

1. It is not sufficiently stimulating, primarily, to the digestive tube. The residue, however, that is the cellulose contained in the bran which has been dreaded so much and by so many, nevertheless possesses most useful qualities, if present in small quantities only, for it sustains the tone of the digestive tube, raises the power of functioning, and strives against atony and constipation. In our days it is the digestive tube of all organs which shows the most marked degree of degeneration. Constipation, cecal stasis, and all the evil consequences, enterocolitis, appendicitis, and premature senility, are they not all partially, at least, due to this regrettable use of flour so quickly assimilated, and leaving no ash? Many authorities have answered this question latterly in the affirmative.

The white bread is not sufficiently stimulating to the general organism. This contention will be clear to him who understands the inti-

mate relationship that exists between the digestive and the general tone. If, on the other hand, the general organism has to fear evil results from the atrocious and coarse overstimulation caused by certain foods, then it cannot either, on the other hand, be satisfied with the normal tonic furnished by alimentation in general. Cellular life is a function due to excitation; a diminution in the latter is bound to lessen the intensity of the former. This insufficiency of stimulating power is particularly serious in a food which represents two-thirds of our daily needs and constitutes the source of an energy so minutely graduated and so well regulated. We need not be amazed if, with the introduction of white bread in the country districts, the peasant, finding no longer the required quotum of stimulation in the bread, goes to seek it elsewhere.—(*Monteuuis.*)[1] And here it is where the bread question touches the question of alcohol.

The second defect in the white bread is, that it is not sufficiently mineralized and is insufficiently phosphorated. This fault, of grave

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[1] Monteuuis: "L'alimentation et la cuisine naturelle dans le monde."

import for this as well as for all other aliments, represents a deficiency of about 20 per cent of mineral matter in our ration, as has been amply demonstrated by chemical analysis.

We quote from Muntz the following table showing the comparative composition of flour ground on metal and flour ground on stone.

	Ground on Metal.		Ground on Stone.	
	Crust.	Crumb.	Crust.	Crumb.
Nitrogenous matter...	8.06	5.87	8.50	6.62
Ash................	1.81	1.57	2.52	2.06
Phosphoric acid.....	0.19	0.13	0.28	0.20

The sifting and bolting accentuate still more the damage already done. Of 21 parts of mineral salts contained in 1,000 parts of grain, only 5.5 are in the flour, while 15.5 are in the bran; and of 8.93 parts of phosphorus, 2.33 are in the flour, and 6.60 in the bran. The bran, therefore, which we so ingeniously separate from the flour to the highest potentiality, carries off with it three-fourths of the mineral constituents of the grain, i.e., phosphorus, magnesium, etc.

But it can serve no good purpose to dwell any longer on the importance of these facts. An organism impoverished in mineral substances, a nervous system robbed of its per-

centage of phosphorus and magnesium, must of necessity be vitiated and impaired. We cannot help but admit that this deterioration of bread logically crops from the customs of our times and from the intensity of our present-day life. In the same measure our nervous and cerebral underfeeding intensifies the phosphoric disassimilation; and demineralization is on the daily increase.

Many efforts have already been made to remedy these evils, which are the natural consequences of our industrial progress.

We have already discussed the drawback to be found in white bread, so far as the bowels are concerned. To counteract constipation certain kinds of bread have been recommended which leave a sufficient percentage of residue; among them rye-bread, also called brown bread or black bread, likewise Graham bread, which is made with all the elements of the whole grain coarsely ground. All these are serviceable, but, after all, only to heavy eaters with a robust digestion. Most of the modern stomachs, however, are too delicate to digest them.

The more and the better this question is studied and ventilated, the clearer becomes the

object to be attained, and the greater will be the efforts to produce an ideal, rational bread which will possess all the required good qualities. Two formulas have been suggested: one faction recommends the true whole-bread containing the whole of the grain; another faction wants the brown bread, called also "modern" brown bread (*Monteuuis*), which ranks half way between the white bread and the whole-meal bread. We freely give our approval to the latter form. The only strong objection to the whole-meal bread is the difficulty of digesting and tolerating it. Our economy no longer seems strong enough to support a food relatively coarse. With the brown bread the inconvenience is minimized. Moreover, it is advisable to proceed slowly in this reform by taking, for instance, in the beginning, 50, then 100, then 200 grams, and so on, until the full amount can be consumed with impunity. The advantages of mineralization seem to equalize themselves after a short time. Fauvel[1] substitutes for white bread one equal part of whole-meal bread and one equal part of modern

[1] Fauvel: Congrès international d'hygiène alimentaire. Paris, 1906.

brown bread, and claims that in two cases under observation the increase in phosphoric excretion was about 0.25 gram. A daily gain of 0.25 gram would mean for the year a total of 91.25 grams of phosphoric acid.

We need scarcely come back again to the special varieties of bread which are sold at more or less advanced prices to the public. After all, it is, perhaps, easy enough to obtain at the baker-shop bread made from any grade of flour.

The question is not without difficulty, however, and possesses interest enough to justify continued efforts in the right direction.

BISCUITS—CRACKERS

They owe their name and properties to the manner of their manufacture, i.e., a paste consisting of wheatmeal and water twice baked. They are easy to digest and very nutritious. Many contain also milk, butter, and eggs in variable proportions. The average composition of dry biscuits is:

Albumin.	Fat.	Carbohydrates.	Ash.	Available Calories.
8.99	7.92	69.74	1.34	399

A glance will reveal their value as an article

of food and the high percentage of mineral content.

As they are very easy to digest, and not subject to putrefaction, they are suitable for digestive troubles. In *intestinal dyspepsia*, in all *gastric*, *cardiac*, and *liver* complaints, in *Bright's* disease, and in *anorexia*, they should replace bread to advantage, and allow of happy changes in a diet otherwise insufficient. In the milk diet they are indispensable for correcting insipidity and desirable proportions. We take exception, however, to all kinds of biscuits or crackers that are lined, coated, or stuffed with creamy or jammy substances, for they are hard to digest and belong rather to the category of pastry.

PASTRY

An enormous variety of articles, all dissimilar in composition, quality, and food value, belong to this denomination. Nevertheless, since paste is the principal ingredient—and all its injurious qualities are common to most of them—we have thought it reasonable to speak of it here under the head of wheat flour.

Butter and eggs are employed in varying

proportions, and the whole is carefully mixed, rolled, and cooked in a slow oven. The product is of a solid consistence, very nutritious, but difficult to digest, especially when not sufficiently baked. The puffs are perhaps a little lighter, but frequently bear the disadvantage of being made of stale cake.

Paste is only the foundation of this unhealthy and antihygienic food. The multitude of recipes and formulas is the sum total of all the mischief wrought by their use, no matter under what name they are advertised and sold; petits fours, fondants, dragèes, pralines, fritters, pancakes, they all belong to the long list of dangerous, mischievous preparations called pastry. Their bad qualities belong to the digestive order. They surcharge and fatigue the stomach and invite intestinal putrefaction.

The whole catalogue of cakes, sweetmeats, cookies, and pastry, without exception, must be forbidden in *dyspepsia*, *enterocolitis*, *diarrhea*, and *constipation;* in *cardiac* and in *Bright's* disease, in *eczema*, and in all *skin* diseases; likewise in *diabetes*, *liver troubles*, *obesity*, and *arthritis*. The hale and hardy are cautioned to use discretion. The gentle sex particularly is prone

to commit indiscretions in this direction, a fact which accounts for the many crises in *dyspepsia*, *anemia*, and *diabetes* among women.

But there is a kind of home-made pastry which may grace any table and even prove of benefit to the sick, as it is light and easy to digest, pleases the palate, and possesses none of the offensive qualities mentioned above—*diabetes*, however, always excluded.

It embraces, according to Pascault—setting aside the biscuits already mentioned—the following:

Cakes made of sweetened paste (flour, sugar, eggs, and butter), known as madeleines, Genoa and Savoy cakes.

Gingerbread and ginger-snaps.

Tarts made with fruit or rice, but always presupposing that the crust of the paste be baked crisp.

Meringues made with whipped cream, but not with cream bought of the pastry cook.

We may add brioche, especially flannel brioche, which, if thoroughly done and eaten with butter, is, as a rule, tolerated even by dyspeptics.

NUTRITIOUS PASTES

These are obtained by mixing wheat flour with variable, but always small, quantities of milk, butter, and eggs; macaroni, vermicelli, noodles, tapioca, Italian paste. All these are as near as possible identical in composition.

We give only the analysis of macaroni.

Albumin	10.46		
Fats	0.70	Chlorid	0.08
Carbohydrates	72.34	Purin	0.00
Ash	0.83		

Available calories = 349

Although the proportion of the constituents approaches that of the cereals, especially that of bread, the food value is lower, for the ash is alkaline, and the percentage of phosphate of soda is too high.

However, they are light, especially for intestinal digestion.

Combe recommends them strongly in his regimen for gastric and intestinal dyspepsia. They serve as a substitute for bread in *gastric dilatation* with fermentation, and in *enterocolitis*.

To be truly efficacious they should be pre-

pared without butter and cheese; simply boiled in slightly salted water. When placed on the table, a small dab of butter and some grated cheese may be added to make them more palatable. According to Combe they are more digestible if no eggs are used.

Contraindications are *diabetes* and *obesity.* They agree with all whose bowels function badly, i.e., in *liver* complaints, *cardiac* affections, *Bright's* disease, and often in *arthritis*, but their use must be properly gaged.

In dyspeptic tuberculosis, rapid and lasting fattening is often achieved with a generous diet of these preparations.

CHESTNUTS

In many parts of the world the large and the small varieties of chestnuts play an important rôle in the diet of the inhabitants. In Corsica, they are called "the bread of the tree." Although they do not belong to the same family, they approach the cereals very closely in composition.

Albumin	6.35
Fats	2.40
Carbohydrates	67.00
Ash	1.60

Available calories = 321

The percentage of nitrogen and carbohydrates is lower than in the flour of wheat, but that of the fats exceeds it. Mineral bodies are plentiful.

The pulp, however, made from cooked or boiled chestnuts, and chestnut flour are not so light, and should not be eaten by *dyspeptics.* As a nourishment to the normal constitution they possess real value.

LEGUMES—PULSE

THESE form a group remarkably homogeneous, so far as good and bad qualities as well as composition are concerned. The composition is almost identical in all of them.

COMPOSITION AND FOOD VALUE

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Purins.	Chlorid.	Calories.
Lentils...........	20.40	1.31	57.40	2.35	0.07	0.07	337.40
White beans.....	17.45	1.39	59.69	2.63	0.07	0.02	334.50
Split peas........	19.35	1.54	57.71	2.10	0.04	0.05	336.00
Dried broad beans	21.01	1.45	55.25	2.22	0.00	0.04	332.00

The content of nitrogen in legumes equals that of meat, but in carbohydrates they are superior.

The nitrogen in pulse is called legumin, i.e., a vegetable casein, which forms with water a paste that is analogous to gluten, but is easier to digest.

The legumes are rich in nuclein—the richer, the younger the growth. They must be classed among the foods that produce uric acid, for instance, meat.

Oxalic acid is found in notable quantities in white and broad beans; lentils and peas are free from it.

If fats are absent, the carbohydrates abound in the form of starch in about the same measure as in the flour of cereals, but the percentage of cellulose is sensibly higher, though principally localized in the skin, or husk, of the seed. This, of course, enhances the food value of decorticated pulse. The ash contributes a large part of this high dietetic value, as its percentage is twice that of meat or bread. The young, green legumes are mineralized in a higher degree with a corresponding elevation of calories. Potash is preponderant, and when combined with soda—present in a lesser degree—it adds a certain amount of alkalinity, but far below the proportion contained in other vegetables.

Phosphoric acid also obtains a higher rate, exceeded only in cheese, the yolk of egg, and oatmeal; and, being almost wholly in an organic form, it is very easily assimilated. Nuclein, lecithin, diphosphates of oxymethylene, place the legumes at the head of rephosphating aliments. Lime and magnesium are well

represented, the latter a bit more than the former. Iron abounds only in lentils.

The alimentary value of legumes is considerable. They constitute almost a complete food, for albuminoids and carbohydrates are present in high proportions. Rübner was able to maintain the balance of nitrogen and carbonic acid in the men on whom he experimented by giving 520 grams of dry peas per day. But, mind you, results like these are of no other than a purely experimental value.

The moderate cost also adds much to their worth. The cheapest calorific unit to be found is that of the legumes. One hundred calories of split peas cost less than one hundred calories of white bread. It requires only one kilogram (a little more than two pounds) of split peas to make an equivalent of 1,400 grams (about three pounds) of bread, and the expense is smaller. To this must be added the ease with which the legumes can be kept and their inalterability, factors that establish them as a food of the first order, well adapted for provisioning large masses of people.

For practical purposes, however, it is well to bear in mind that this high nutritive poten-

tiality, especially from the standpoint of superalimentation, needs strong correctives.

All legumes absorb, in the cooking, large amounts of water; for instance, 300 grams of dried peas make 1,200 grams of purée; for beans and lentils the proportion is well nigh the same. And again, intestinal absorption is far from being perfect, scarcely ever exceeding 91 per cent; while rice, bread, milk, meat, and pastes attain as much as 95 to 96 per cent. Lastly, they produce, especially in the sick, a feeling of fulness, which limits the ratio of ingestion.

PREPARATIONS AND METHODS OF USE

To render legumes digestible and assimilable they must be hydrated and cooked.

Hydration is accomplished, preparatory to cooking, by soaking the pulse in water—each variety according to its own requirements, until the husk is softened off.

This is important, for the water transforms a part of the starch into amylodextrin, thus facilitating the process of digestion and absorption in the canal. It equally modifies the cellulose and makes it more absorbable. Legu-

min has a tendency to form, during cooking, insoluble combinations with the carbonate of lime contained in the water which indurates or toughens the mess. For this reason soft water should be employed. Hard water may be softened by adding from 3 to 5 grams of bicarbonate of soda per liter.

The rule, almost universally observed, to cook legumes just for one hour, we consider ill advised. It offers several disadvantages which we may as well point out at once. It is a mistake to cook pulse in a large volume of water which is afterward poured away, for in this manner a certain amount of sugar is drained off, thus lowering the nutritive quality of the food and diminishing its digestibility. It wastes the aromatic essences, which flatter both taste and smell and stimulate the physiological secretions of the stomach produced by psychic reflex action. It also entails a heavy loss of important mineral salts which are dissolved by the water in cooking.

Legumes should be cooked over a slow fire in the smallest amount of water compatible, and in a vessel hermetically sealed. It is easy enough nowadays to find utensils specially de-

signed for that purpose. We shall revert to this subject later on.

The seasoning of legumes can easily be accomplished. Butter or oil will add the required amount of fats which are lacking.

Sick persons should eat them in the shape of a thick soup (purée), or use only the husked article, for the peel is hard to digest, overloads the stomach, and irritates the bowels. Nevertheless, this has its disadvantages also. The purée is swallowed too rapidly, without proper mastication, which is bad for the stomach and deprives intestinal peristalsis of that residue of cellulose which serves as a physiological stimulus. This form of diet should be restricted to cases of necessity only.

REACTIONS

a. *Digestive.*—If we consider the constituents only, we have seen that they are almost the same as in cereals, excepting the large percentage of albumin which slightly embarrasses the gastric action. But then it is chiefly the cellulose shell which retards the attack by the ferments and impairs digestibility. The necessity of prolonged mastication to com-

plete the work of cooking will thus be apparent.

In the intestines the dry legumes react at once, through their albumin and starch, on the glandular system, principally the pancreas, and through the cellulose on the muscular system. If ingested in overlarge quantities or crowded into the canal otherwise overtaxed, they quickly provoke acid or gaseous fermentation.

b. *General and Excretory.*—From this double standpoint they occupy a place exactly midway between the cereals, on account of the large volume of nitrogen and nuclein. Nevertheless, they should be rather counted among the stimulating and toxic aliments, being, as it were, a vegetable meat.

After what we have said about the nutritive qualities of the legumes, it will be easy to find the place which they should occupy in the diet of the artisan and laborer largely as a substitute for meat, of the soldier, of the masses in general, and of anybody in sound health and endowed with a good digestion, especially in the winter months. In the summer-time, when our calorific needs are less acute, preference should be given to the fresh article.

Legumes are a particular requisite for the diet in childhood and during the period of adolescence, when the construction of tissue demands the aid of phosphorous elements, of lime and magnesium, all of which are furnished lavishly by the legumes. In cases for remineralization and rephosphatization in convalescence, and, above all, in tuberculosis, they will answer the call.

In all these cases the dried legumes should be taken entire. To advance gastric tolerance all that is required is thorough mastication. However, there are conditions in which they will not be supported, except in the shape of thick soups, or when decorticated. Among these we give mention to *dyspepsia*, either hypo- or apeptic; in the average cases of *dilatation*, and in *gastritis* of long standing; also in *secondary dyspepsia* of *tuberculosis*, in *anemia*, and *neurasthenia*. Likewise in *enterocolitis*, *enteritis*, and *enteroptosis*. Here preference should be given to peas, lentils, and kidney-beans.

For children afflicted with *hereditary arthritis*, whose intestines are so often delicate and irritable, they form an important part of the diet.

Finally, there are cases in which their use

is absolutely interdicted in any shape or form. First of all, in *diabetes*, not only because of their high percentage of carbohydrates, but also because they belong to the foods hardest to digest, following immediately after the saccharose and starch of bread.

Then, in *obesity* and *hepatic affections*, as they possess a strong tendency to be transformed in the liver into fatty substances; likewise in *hyperchlorhydria* and in the *major gastric dilatations*, where their hyperacidity arrests the digestion of starch and provokes putrefaction.

Lastly, in *arthritis*, not so much because they are too nutritive, but on account of their tendency to produce uric acid. *Gout, gravel, rheumatism, migraine, neuralgia* are danger-signals for removing them altogether from the diet list. *Scleroma, cardiac* affections, and *Bright's* disease belong to the same catalogue.

PARTICULARS

1st. *Lentils.*—These are particularly valuable from every point of view, because the percentage of cellulose is low and they are easy to digest. On this claim they are of special benefit to *dyspeptics* and in *enteritis*. Their large

content of iron gives them the preference over all the other legumes. Being ferruginous they rank in line with, or immediately after, pudding, the yolk of egg, certain green vegetables, and certain fruits, and therefore are wholesome food for *anemics.*

2d. *Beans.*—There is a large variety, notably white and brown beans, whose composition varies but little. Rich in cellulose, and containing a slightly higher percentage of fats than the other legumes, they are less digestible. They ferment easily and give rise to formations of gas, for which reason they are especially contraindicated in *flatulent dyspepsia.* But they are rich in phosphorus and magnesium, hence beneficial to adults and growing youths in good health.

Kidney-beans are much finer and much more easy to digest than the other kinds, but they are also richer in xanthic bodies.

String-beans are almost on a par with fresh vegetables, of which we shall speak presently. The pulp represents less than 9 per cent of their weight, the rest of 92 per cent is water. They contain not more than 4 per cent of carbohydrates at the utmost, principally in the form of

nuclein, inosite, or amylaceous bodies which do not produce glucose. In *diabetes* they are permissible.

But they are contraindicated in *arthritis, uricemia, oxaluria,* and in diseases of the *liver*, by reason of their heavy content of uric and oxalic acids.

3d. *Peas.*—On account of their composition, their percentage of nitrogen, fats, and starch, they are midway between lentils and beans. The marked presence of cellulose makes them equally as hard to digest as beans. Split peas, which are deprived of the husk, are more nutritious and better tolerated than dried peas. Both are eaten in the shape of thick soups (purée). To prevent putrefaction it is wise to add small pieces of toasted or fried bread (sippet or crouton), which insures slower eating and better mastication.

Fresh green peas contain relatively little sugar, though a trifle more than string-beans. But they contain quite an appreciable amount of xanthic bodies, entailing the corresponding contraindications. Well mashed they are easily digested, and the cellulose is assimilated to a large extent.

4th. *Broad Beans.*—They excel in cellulose (we have classified the legumes in accordance with the increasing percentage of cellulose: lentils, kidney-beans, peas, broad beans). It follows that the latter are a dish relatively heavy and indigestible. In spite of the abundance of phosphorus, and, above all, of magnesium (no other food contains more), they cannot be recommended, except to robust stomachs. Decorticated, they are a little bit easier to digest; but for farm laborers they are an excellent food.

POTATOES

Potatoes are the most widely spread type of tubers. Their properties place them between the cereals and legumes on the one hand, and the green vegetables on the other. The preponderance of water depresses their food value. The percentage of carbohydrates is low, and that of albumin still more so. The mineral value of phosphoric acid, lime, and magnesium is superceded by potash and soda, and confers upon them a higher alkalinity than that found in fresh vegetables.

COMPOSITION AND ALIMENTARY POWER

Albumin.......	1.73		
Fats	0.11	—Chlorid ..	0.01
Carbohydrates ..	20.00	—Purin ...	0.003
Ash...........	0.77		

Available calories = 90

These figures, which represent the mean composition, vary, however, not only in the different varieties, but also with the age of the

potato. In the spring of the year, for instance, their content of carbohydrates is higher than in the autumn and winter months.

The carbohydrates, which are about the only nutritive quality possessed by the potato, are present in the shape of starch or yeast. Heat transforms the starch into sugar; but, when the potato is exposed to cold for some time, this phenomenon is reversed. If kept too long in a warm place, the potato begins to sprout, and the change of starch into sugar becomes absolute.

The content of nitrogen is small, and nearly half of it manifests itself not in the shape of albumin, but as glutaric acid, i.e., asparagin, leucin, and tyrosin.

The ash contains only a small amount of phosphoric acid, a little magnesium, and a still smaller quantity of lime, but up to 60 per cent of potassium. For this reason potatoes should never be eaten without salt. Bunge demonstrated that potassium, ingested in this manner, splits the sodium chlorid in the blood and forms a chlorid of potassium which, if present to excess, is eliminated through the urine. This loss of chlorin must therefore be restored by

other means, because the potato contains scarcely any trace of it. The potassium in the potato is partly combined with organic acids and partly with phosphoric acid, and makes the ash strongly alkaline. Iron is represented in fair quantities.

The alimentary value, contrary to popular belief, is small, because intestinal absorption is imperfect. The figure 90 given above refers only to the eatable portions. In potatoes bought at the grocery the loss is heavy, for they do not, as a rule, yield more than 69 calories to every 100 grams.

METHODS OF PREPARATION

For the purpose of modifying the starch and rendering it more assimilable, cooking is indispensable. The method of cooking, therefore, as well as the manner of seasoning, greatly enhances the nutritive quality of the potato, while weight is not appreciably affected by boiling. One kilogram (about two pounds) of raw potatoes makes just 1,000 grams when boiled. We must not lose sight of the fact that a part of the essential salts is lost in the water. This loss may be compensated for by the addition of

kitchen salt. However, it may be circumvented by *baking*, *puffing*, or *steaming* the potatoes. Baked potatoes lose one-fourth their weight by evaporation, and therefore are commendable. When puffed or steamed, scarcely any change in the weight takes place.

Mashed potatoes are good food, especially for *dyspeptics*. They absorb nearly their own weight of water. The addition of milk largely increases the rate of albumin and fats, therefore that of nutrition.

Potatoes, fried, possess almost double the alimentary force on account of the large elimination of water and the addition of fat; but they are harder to digest.

When they are prepared with butter or dripping, or made into a potato salad, the same rule applies.

REACTIONS

a. *Digestive.*—Of all vegetable foods potatoes are the easiest on the stomach. Nitrogen is reduced to a minimum; starch is present in the shape of finest division; the cellulose is tender, and small in proportion. But seasoning may, as we have seen, affect the digestibility very smartly.

The influence on the intestinal digestion is equally propitious, inasmuch as the carbohydrates stimulate pancreatic secretion, and peristalsis receives a moderate and beneficent reflex action from the cellulose residue. Putrefaction is rarely observed.

b. *General.*—Potatoes have a rather liberal effect on the nutritive process and on the cellular system in general. Being poor in nitrogen, but rich in ternary bodies, they undoubtedly restrain the energy of the economy. By their wholesome action on the digestive organs they improve the general tone of the whole system. Their alkalinity advances oxidation and the combustion of cellular waste.

c. *Renal.*—The abundance of potassium salts makes them slightly diuretic.

INDICATIONS AND CONTRAINDICATIONS

We have no hesitancy in declaring potatoes a good food article, although the nutritive value is below that of bread and pulse, and the purchase price is higher. One thousand calories of potatoes cost 45.82 per cent more than one thousand calories of white bread, and 42.40 per cent more than one thousand calories of split

peas. They are by no means merely the poor man's food, for they grace the rich man's table perhaps even more.

In pathological conditions the indications center partly in their digestibility and partly in the high rate of alkalinity. The first quality addresses itself to weak and disordered stomachs, i.e., to *dyspeptics* by *insufficiency*, to *anemics*, *debilitated persons*, and *convalescents*, by all of whom they are well supported, provided they reach the table either baked or steamed, or mashed with milk or a small allowance of fresh butter.

In *intestinal troubles* the potato proves likewise of benefit, especially in cases of *constipation*, so common among women, when they should be consumed at the midday meal.

In *Bright's* disease or *cardiac* affections baked and mashed potatoes should figure in the menu, because the absence of chlorin and the high percentage of potassium makes them a diuretic food. If we admit the theory of Bunge, they should be of decided use in cases of *œdema*.

Their high alkalinity points to them in *hyperacidity* and *arthritis*. Besides, although "filling," they are less nutritive and certainly do

not favor superalimentation. *Arthritics* may safely risk eating meat and fish garnished with potatoes so long as the latter are not fried, "sautées," or buttered.

If potatoes in large portions have been specially recommended in cases of *diabetes*, it certainly was on the score of their high alkalinity. It is true, Labbé has shown that the starch in the potato is the largest portion of its utilizable components, but this quality does not seem of sufficient importance to permit of an explanation of the many cases in which improvement has been observed. On the contrary, as we have said about arthritis, the diabetic who stands in need of fats should season his potatoes with butter, dripping, or oil.

In *gout* or *liver* complaints they are also a welcome nutrient, readily taking the place of bread, which is acid and harder to digest.

In *obesity* they are harmful. Stoutness is frequently due to the abuse of farinaceous foods in general, and of potatoes in particular.

CHANGES

When the potato sprouts, it often happens that solanin, which is formed at the expense of albumin, increases in very disquieting proportions. From 0.04 it may rise to 0.60 gram per kilogram and cause *poisoning, diarrhea, vomiting,* or *dilation* of the pupils. Sprouting potatoes should never be consumed. If, however, their use cannot be avoided, it is well to remember that solanin is centered chiefly around the sprouts, and that by peeling thickly and cutting out deep the shoots the danger of poisoning is minimized.

THE USE OF FARINACEOUS FOODS AND OF LEGUMES IN INFANCY AND CHILDHOOD

Toward the end of the first year milk becomes insufficient as a nourishment for the child and farinaceous substances must be called into service which afford new elements in new proportions, favoring the development of the digestive organs and of the body in general. They are particularly useful when inflammation of the bowels makes milk toxic and dangerous. Recent experiments have shown what excellent

results may be obtained in such cases by the administration of light farinaceous foods, and with soups made from legumes. We will add here a few words about their twofold usefulness in the healthy as well as in the ailing infant.

The flour we refer to is either obtained from cereals—barley, oats (gruel), maize, rice; or from legumes—lentils, peas; or from tubers—the fecula of potatoes, tapioca, arrowroot.

With the exception of the last three mentioned, we know already their relative composition.[1]

The fecula of potatoes represents starch almost in its pure state. Tapioca is a fecula derived from a plant called manioc, which grows in Brazil. When treated by heat it becomes translucent.

Arrowroot is a fecula made from a plant growing in the Antilles; it is called *maranta indica.*

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Fecula of potato.	0.74	0.05	78.32	0.43	324
Tapioca	0.17	0.37	84.50	0.09	349
Arrowroot......	0.88	0.18	82.50	0.20	344

[1] The flour made from peas and lentils is practically of the same composition as that of dried legumes, of which we have already given the analysis.

Nitrogen and fats are wanting, but the salts are abundant. Starch really represents the true nutritious value which is considerable.

These different products have a special claim each as *baby foods* by a series of qualities which is common to them all, but is more or less pronounced in each individual variety.

1st. They are nutrients very easy to digest; they require but the slightest exertion on the part of the stomach as well as of the intestines. Yet, from this point of view, their value is unequal and their composition permits of making a scale of digestibility of which we shall speak anon.

2d. They exert an antiseptic action upon the intestinal flora. We have dwelt on this question to some length (page 170), so need not recur to it here; but this quality is of particular value in the infant forever exposed to the dangers of intestinal infection.

3d. With the exception of the feculæ, the percentage of mineral bodies is very high, a quality to be much appreciated at an age when the organism is building its frame and laying the mineral foundation for its cellular system. Organic phosphorus, which is so plentiful

among them, is a powerful aid in the proper adjustment of the chalks and phosphorus in the osseous tissues.

4th. Their nutritive power is high, as the table given above shows. Yet danger lurks in this advantage, and the child must be constantly guarded against overfeeding.

5th. They keep for a long time without undergoing a change. While traveling during the hot weather season, when the milk goes wrong so easily, they are most convenient articles.

For the normal child, whose digestive tube is in good shape, these flours may be mixed with the milk, boiled for fully five minutes in order to facilitate the digestion of starch, and given in drafts gradually more concentrated and increased in amount. A systematic progression should be followed not only as to quantity, but also as to the quality of the flours used, especially during artificial and mixed nursing.

Previous to the sixth month the digestive ferments are but little developed in the baby, and milk alone should be given.

After the sixth month, when the salivary and pancreatic juices begin to exert their influence,

only starchy flours should be added: fecula of potato, cream of rice, arrowroot, and tapioca.

We put tapioca at the end of the list, because it is a trifle harder to digest than the rest.

After the twelfth month flour, slightly albuminized, may be introduced, wheat-meal, barley, rye, maize, oats (all given here in the order of their digestibility).

During the third year, or sooner or later according to the digestive aptitude of the child, flours rich in albumin may be employed; lentils, peas, beans. Each of these should be given alternately.

A regular system of rotation should be established and the child should not be limited to one variety only.

However, the flour made from legumes, being highly nitrogenized and rich in xanthic bodies, must be rather eschewed in children with delicate stomachs, especially when subject to arthritis or eczema.

When nursed at the breast, these broths cannot be given until the child has been weaned, when the method of procedure will be quite simple, but the child should, nevertheless, be subjected to methodical regulations.

As for quantity, careful watching is no less required. Between six and nine months it is sufficient to add one teaspoonful of the broth to the milk once a day. By and by the amount may be increased, keeping a strict account of the daily rations, always remembering that one generous teaspoonful of flour weighs about 10 grams, and consequently represents an average of 350 calories.

In cases of *enteritis* and *gastroenteritis*, so common and of such serious consequence in the first tender years of life, and when milk is calculated to aggravate the trouble, the cereals and legumes will render signal services, but then the method of employment differs. The lack of digestive juices and the fear of putrefaction demand their application in very liquid and the least nutritive form. Cereal decoctions, and broths made from legumes, are among the preparations most in use. We give two reliable recipes.

CEREAL DECOCTION ACCORDING TO COMBY

Wheat	30 grams of each, or 1 good soupspoonful
Pearl barley	
Crushed maize	
Dried beans, shelled and unshelled	
Lentils, shelled and unshelled	
Dried peas, shelled and unshelled	

Put into 3 liters of water, boil thoroughly for three hours. Add 1 liter of water and 5 grams of salt. Then strain. It should yield 1 liter of broth.

BROTH MADE FROM LEGUMES AFTER MERY

Potatoes	60 grams
Carrots	45 "
Turnips	15 "
Dried peas	6 "
Dried beans	6 "
Water	1 liter

Soak the dried legumes first in cold water. Bring the water to a boil and add the other vegetables. Boil for a quarter of an hour in an earthen casserole or a porcelain dish provided with a cover. Add 5 grams of salt. Strain.

These two preparations, which may be varied *ad libitum*, have a strong compound of mineral substances, and for that reason make excellent broths. As they ferment or turn sour very eas-

ily, it is wise to keep them in a covered dish and in a warm (not hot) place, but not longer than twenty-four hours. The nutritive coefficient is rather of a moderate degree. They represent, so to speak, a sort of water diet; but have, especially the broth made from legumes, the advantage of maintaining the mineral reserves in the organism. The predominance of inorganic elements, chiefly that of sodium chlorid, is held by many authorities to constitute the basis of their therapeutic efficiency.

They certainly form an excellent substitute for the rigid water diet, especially in acute diseases in which salts (liquid or crystallized) prevail. The treatment should not be protracted beyond a period of ten days; neither should the broths be given during the first six months after birth.—(*Mery.*)

At the end of ten days more solid feeding should be resumed, beginning with buttermilk, light soups made from fecula of rice, gruel, or such preparations as we have referred to already under the head of substitutes for milk. Great caution is advisable in the resumption of a heavier diet. It should not be started until all the morbid symptoms have completely disappeared.

GREEN VEGETABLES

THIS class comprises all those vegetables which are, as a rule, consumed immediately after they have been gathered. They are also known under the name of fresh or aqueous vegetables, because water is their chief constituent. We prefer, however, the denomination of "green vegetables."

The varieties are very numerous and differ considerably in accordance with climatic conditions and surroundings. We shall first discuss the properties common to them all, and then particularize the qualities of each individual kind, reverting afterward to the indications and contraindications.

COMPOSITION AND FOOD VALUE

Green vegetables are individualized by three distinct characteristics common to them all in the same degree.

1st. Water is the principal factor in their composition, varying from 85 to 95 per cent.

The juice of fruits and even milk are less watery.

2d. The mineral principles are very weak. The ash represents only 1 to 2 in 100 parts of fresh extract, and 10 to 20 in 100 parts of the dried compound. Sodium, and again potassium, preponderate and confer upon the vegetables a strong percentage of alkalinity, which acts as a powerful aid in combating the evil effects of hyperacidity, against which man has forever to guard himself. Silica is relatively abundant. Phosphorus, lime, magnesium, and iron are found in variable quantities. Chlorin does not reach even 0.01 per cent.

Besides these mineral components, which are nothing uncommon in all our foodstuffs, a few of the green vegetables show also traces of iodid, manganese, arsenic, and fluor. It is more than probable that these metalloids play an important rôle in physiology. Of course, when present, they enhance the mineralizing value.

3d. The abundance of cellulose, although characteristic, is perhaps also of smaller significance, because dry legumes when not decorticated, as well as certain fruits, are much richer in cellulose. Nevertheless, green vegeta-

bles derive a great deal of their alimentary power from this presence of cellulose, at least one-half of which is digested and absorbed, but only when the vegetable is just from the garden. In large cities this condition is hard to obtain, as the supply comes from a distance and reaches the consumer in all possible grades of freshness. This defect in the absorption of cellulose is one of the many inconveniences caused by the difficulties accompanying the problem of provisioning large centers of population.

The real caloriferous principles, such as albumin, fats, and carbohydrates, are small in proportion. Nitrogenous substances scarcely reach 1 to 3 per cent. Among them we must mention a small amount of casein, vegetable legumin, and phosphorated nucleo-proteids, all present in the form of albumin. The rest are under the form of amid, amidoacids, leucin, tyrosin, glutamic and aspartic acids, all of very doubtful value.

The percentage of fats is small. They are partly composed of phosphorated lecithin.

We must not neglect to mention the aromatic substances, nor the essences, acid and piquant to the taste, which confer upon many vegetables the merit of genuine condiments.

The carbohydrates are the most interesting part to study in the garden vegetables which take such a prominent place in the diet of diabetics. The percentage balances between 3 and 5. Contrary to the cereals, starch and its derivatives (cane-sugar and glucose) do not represent even one per cent. In their stead we find, however, sugars much easier supported in diabetes, such as levulose, galactose, mannite, inosite, dulcite, a small portion of inulin and dextrin, and certain mucilages and gums, unfortunately hard to assimilate.

The nutritive power derived from all these compounds is exceedingly small, as by far the largest amount is due to the ternary bodies. However, this defect is outweighed by the abundance and variety of inorganic bodies. According to Gautier, man draws from this source about one-fifth of his daily mineral ration. This is the reason why alkaline and mineralizing foods must figure in our diet.

METHODS OF PREPARATION

Fresh vegetables must first of all be most carefully examined and thoroughly washed in several changes of water, to which should be

added some kitchen salt. They become soiled by the ground in which they grow, the dust from the roads, and the water used for irrigation (especially dangerous in the vicinity of large cities). If cleanliness is required in every food, it is trebly needed with vegetables.

Radishes, long and round, or black or white, beet-root, tomatoes, onions, artichokes, may be eaten raw, either with salt or vinegar and oil to make them softer and more digestible, or without. They are all heavy, and must be prohibited in *dyspepsia* and in all cases of *intestinal disturbance;* but in the normal stomach they act like stimulants and aperients, and have, especially in the summer-time, a tendency to whet the appetite. To counteract the irritating effects of the aromatic essences contained in them, they must be thoroughly masticated.

Often a prolonged cooking of the vegetables is required in order to effect the softening of cellulose and the bursting of the vegetable cellules; it assists at the same time in dissolving the starchy matters, the gums and mucilages, and to render them more assimilable.

We have already given hints how to preserve in the cooking the nutritive principles, the aro-

matic substances, and the essential salts. We confine ourselves, therefore, to a few remarks here about the importance of preventing the waste of the salts. In spinach, for instance, nearly 7 per cent of the mineral content may be lost by pouring away the water. Yet there are certain vegetables, such as artichokes and asparagus, which must be cooked in plenty of water; but the water so used should not be thrown away, but utilized for making sauces or vegetable soups.

It is quite a different thing, however, when vegetables are prepared for *diabetics*. In this case plenty of water should be used, in order to reduce the proportion of the carbohydrates. Von Noorden recommends even to cook them twice in an excess of water, and each time to pour off the liquid.

REACTIONS

a. *Digestive.*—The action of the aqueous vegetables on the stomach is complex, and must be properly analyzed. The nutritive principles, i.e., the ternary and nitrogenous bodies are, so to speak, a negligible quantity. But this defect is offset, to a certain extent, by the higher per-

centage of the savory and odorous substances—those aromatic essences which slightly stimulate the gastric secretions and act as substitutes for condiments. On the other hand, against this benign influence, operates the inverse action of cellulose, which ferments easily, overburdens the stomach, retards evacuation, and even secretion, whence arises that feeling of surfeit so frequently experienced when partaking of vegetables. On the whole, many varieties are hard to digest unless they are absolutely fresh and mashed, or, still better, strained.

In the intestinal canal cellulose produces more essential effects by provoking intestinal peristalsis. With some it acts simply by mechanical contact; with others the reaction is indirect. It undergoes a process of fermentation and is transformed into carbonic, lactic, sulphurous, and fatty acids, which continue their course through the muscular system. But it is easy to understand how readily this fermentation may become exaggerated, thus turning the advantage into an inconvenience, and the vegetable into a carrier of putrefaction and flatulency.

b. *General.*—These foodstuffs have a very low stimulating power. Their action is vested

principally in their alkalinity, which advances oxidation and the nutritive process in general.

c. *Renal.*—The large percentage of water and potassium renders them diuretic. Yet, some varieties contain elements such as purin, alkaloids, ether, benzoic acid, which act as irritants on the kidneys.

INDICATIONS AND CONTRAINDICATIONS

One of the useful qualities of fresh vegetables undoubtedly is that they prevent man from eating too much. This may sound paradoxical, yet will appear justified, if we remember that bulky, yet less nourishing as they are, they soon provoke a feeling of satiety. It seems that by a special dispensation of Providence they appear on our tables during the summer months, when the excessive heat reduces our daily needs almost automatically and without giving cause for alarm. Green vegetables are essentially a summer food, the same as the dry legumes are intended for the winter; and both, though endowed with different calorific values, furnish an abundance in mineral compounds. They are more appropriate for the diet of the well-to-do, of heavy eaters, and persons of sedentary habits,

than for the man who performs manual labor, as he cannot find in them an equivalent for the expenditure of muscular exertion.

Their low nutritive power puts them also to the fore in the pathological domain. In obesity, they greatly assist in reducing the pain and inconvenience occasioned by the starving process. All regimens prescribed for stoutness contain green vegetables in plenty.

In *arthritis* the same profitable results may be obtained. Green vegetables are precious by reason of their alkalinity which counteracts the excessive acidity of the stomach, and of cellulose which relieves constipation. For which reasons they should undergo a process of most thorough and minute mastication to forestall excessive fermentation in all cases when they are employed for cathartic purposes. Moreover, a careful choice should be made among the many varieties, rejecting all those which possess toxic or irritating qualities.

The self-same observations are applicable to *gout*, *uricemia*, and *liver* complaints, for which, as a general rule, the "grasses" are suitable.

In *diabetes* the primary indication is "green

vegetables," for in every form they are serviceable. They fill the stomach and assuage the pangs of hunger so exacting in this disease. Not only is the percentage of carbohydrates low and still more reducible by proper cooking, but a portion of it is present in a form which may be readily utilized by the economy: levulose, mannite, inulin, inosite. According to Gautier, artichoke, oyster-plant, salsify, chicory, lettuce, onion, leek, and Jerusalem artichoke are the most favored varieties in this respect. They exercise a benign influence on the course of the disease, by reason of their alkaline and vegetable albumin contents.—(*Von Noorden.*) For the same reasons they are indicated in *renal complications* or in menacing *coma*. Finally, they assist in digesting the fats with more ease, which is so important a point in diabetes, thus correcting somewhat their own nutritive insufficiency.

While in *dyspepsia* from *fermentation* fresh green vegetables cooked in water or milk are well supported, in cases of *hyperchlorhydria, chronic gastritis, atony*, and *dilatation*, small quantities only, if well cooked, well mashed, or strained, are tolerated. The species, too, is of

importance and, such varieties as are eaten raw must be strictly prohibited.

In *intestinal* affections, with a tendency to *inflammation* or *diarrhea,* green vegetables are ever harmful; but for constipation they are excellent. In *enterocolitis* they should be used with prudence, and only when strained or well mashed. Still greater discretion is ordered in *ptosis* and with *women* afflicted with lax and irritable bowels.

Convalescents, demineralized and *anemic* persons will derive benefit from the mineral reserves accumulated therein, which assist in the reconstruction of the tissues.

In *tuberculosis,* on the contrary, a food so alkaline can be of no practical value.

In diseases of the *skin,* the *heart,* and the *kidneys* no absolute rule can be laid down, as everything depends on the special properties of each individual variety.

PARTICULARS

Sprouts and Bulbs

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Artichokes	2.64	0.25	15.04	0.66	75
Asparagus	1.61	0.14	8.67	0.43	23
Cabbage (green).	3.71	0.47	6.69	0.83	28
Onion (spring)..	1.35	0.24	10.00	0.46	49
Leek	2.00	0.39	7.20	0.85	42

Artichokes.—The lower fleshy part of the leaves is quite nutritious, but very rich in extractives. Manganese is present in large quantities.

When reduced to a pulp (purée) they are well tolerated even by a weak stomach, but prove slightly irritating to the kidneys. In *gout* and *arthritis* they do more harm than good.

Asparagus.—The eatable part is the sprout of the plant before it has exfoliated. Its distinguishing feature is the high percentage of extractive matter (purin = 0.025 per cent) and of iron (9.92). It contains also aspargin and a substance that gives a peculiar odor to the urine. But little is known of this. Asparagus is apt to irritate and congest the kidneys, and, while increasing the production of uric acid, it

impedes its elimination. Traces of manganese are found in the ash. *Dyspeptics* should partake solely of the tips when quite green, and in small quantities only. In *arthritic gout*, diseases of the *kidneys*, of the *heart*, and the *liver*, likewise in *blennorrhagia*, it is better to abstain.

Cabbage.—This is a favorite food among all the nations of the world. Gautier claims that it represents one-fifth of all the green vegetables consumed. The ancients highly extolled its therapeutic value, and it is still employed by quacks and charlatans.

Its chief quality consists in the high grade of mineralization. There certainly is no other food that can outrank it in this respect; phosphorus, lime, magnesium, iron, reach a height scarcely ever surpassed in any other food. Besides, silica is plentiful, especially in cauliflower, with traces of manganese and arsenic. Purin is absent.

It is rather heavy and perhaps the hardest to digest among the green vegetables, and makes a flatulent dish. The different varieties vary, however, in this respect. Cauliflower is the easiest in the lot, then come savoy, green boiled cabbage, and Brussels sprouts.

The culinary art, that adds fats, grease, lard, cream, bacon, and pork, still further increases the indigestibility. Only robust stomachs can stand large helpings.

Sauer-kraut, however, is an exception. The leaves of the cabbage-head are cut into shreds or strips and macerated for not less than ten or twelve days in salt and a little water spiced with bayleaves, peppercorns, and juniper berries. Lactic fermentation makes of this a food easy to digest, but perhaps a little toxic. For the man in prime condition it is an excellent nutriment; but *diabetic* persons should beware of it. As an *antiscorbutic* food it would prove a failure.

Dyspeptics may partake of cauliflower with discretion. All varieties of cabbage must be scratched from the diet list of cases of *intestinal affections*, *liver* complaints, *heart* disease, *albuminuria*, *arthritis*, and kindred diseases.

Onions.—The nutritive power, especially of raw onions, is very superior, attaining as much as 300 calories per 100 grams. Whilst carbohydrates are abundant, ordinary starch is scarcely represented. The acrid essence, so pungent to the eye, strongly resembles that of mustard.

Onions are used a good deal for seasoning almost anything—soups, sauces, stuffings, etc.; and, as they have a stimulating effect on the stomach, they prove useful in *anorexia*, *hypochlorhydria*, in *chronic gastritis* of old standing; but in the other forms of dyspepsia they should be avoided.

In *kidney* or *vascular* or *skin* diseases, in *cystitis* and *blennorrhagia* they are prohibited.

Leeks are similar to onions—richer in essences, but less nutritive.

Garlic is a condiment. Its active principle is sulphid of allyl. It is a gastric stimulant and an intestinal antiseptic. Slightly diuretic, it is yet an irritant for the kidneys and vessels. It should be avoided in *nephritis*, *cystitis*, and in *blennorrhagia*. *Dyspeptics* should treat it with mistrust. By reason of its sulphurated essence its action in *pulmonary* affections is anticatarrhal.

Roots and Beets

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Carrots	0.95	0.25	10.03	0.73	47
Turnips	1.10	0.16	7.30	0.65	56
Salsify	3.44	1.06	12.15	0.53	74
Beet-root (red, cooked)	1.36	0.08	9.22	0.80	44
Celery (knob)	1.64	0.14	8.15	0.62	41

Carrots.—The percentage of carbohydrates is relatively high—7 out of 9 per cent is represented by cane-sugar. The rate of mineral matter is medium, excepting, perhaps, lime, which is six times stronger than in the potato. The nutritive power is small, unless they are prepared with butter and cream.

Intestinal absorption is defective, even more so than in the potato. Carrots, ingested in large quantities, make soft and pasty salts. They prove useful in constipation and to persons of sedentary habits. *Hepatics* may, as a rule, make extensive and more or less justifiable use of them. The presence of sugar puts them beyond the lawful reach of *diabetics.* If thoroughly cooked and mashed, *dyspeptics* need not fear them.

In *turnips* the carbohydrates are not so pronounced as in carrots, though the taste is more

sweetish. They are slightly stimulating, but flatuous, and do not agree with *dyspeptics* or *diabetics.*

Salsify is a rather fibrous food and not adapted to *dyspepsia;* but its compound of inulin makes it agreeable to *diabetics.* The *oyster-plant* resembles salsify in every respect.

Beet-root should be cooked and mixed with salads. It is too hard to digest to suit *dyspeptics,* and too rich in sugar to appeal to *diabetics.* Its content of oxalic acid prohibits its use in *arthritis, oxaluria,* and *atheromatous* affections.

Radishes and *horseradish* are condiments rather than foods. Sulphocyanate of allyl, the active principle of mustard, imparts to them the double quality of acting as a stimulant to the stomach and as an antiseptic to the intestinal canal. If they are properly chewed and masticated, their use is quite rational, especially in the summer-time, and not only by persons in good health, but also in a number of diseases, such as *diabetes* and *anemia.* But when the functioning of the stomach, liver, heart, and kidneys is defective, they become harmful to the economy. In *blennorrhagia* they must be

avoided—horseradish particularly. They contain arsenic.

Herbaceous Vegetables

These are the real green vegetables and possess in the highest degree all the properties, advantages, as well as inconveniences of which we have already said so much.

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Celery..........	1.35	0.21	5.80	0.92	31
Chicory (curly) ..	1.47	0.11	3.10	0.58	20
Cress...........	2.12	0.26	3.76	0.98	27
Spinach.........	2.65	0.36	4.29	1.43	32
Lettuce.........	1.10	0.27	2.91	0.66	19
Sorrel..........	2.20	0.49	4.89	0.81	32
Rhubarb........	0.44	0.54	3.60	0.50	21

Celery, too little appreciated, is a stomach and heart stimulant, but rich in cellulose, to be avoided in *cystitis* and *blennorrhagia.* In England it is reputed to possess antigouty properties.

Chicory has a certain bitter by-taste which enhances its aperient and stimulating virtues. This amaritude is still more pronounced in the *endive.* Mineralization is weak, except in wild chicory.

Cress is an excellent appetizer by reason of its allyl content. It is also rich in iodid, and on this account it may be recommended in *lymphatic* and *parathyreoid* troubles. It is diuretic and antiscorbutic.

Spinach is particularly rich in mineral bodies. It supercedes all others in calorific value, and also in the percentage of mineral content of phosphorus, lime, magnesium, and iron. It is, therefore, an excellent food for *demineralized* and *anemic* patients. But as oxalates prevail, it is harmful in *hepatic* troubles, in *atheroma, eczema, albuminuria, oxaluria, arthritis*, and *gout.* Fresh and carefully cooked, it agrees with *dyspeptics.*

Lettuce is sometimes cooked and served like spinach, but is chiefly eaten as a salad, like *dandelion, corn* salad, and *chicory.*

Irritable stomachs do not tolerate salads well, and in *hyperchlorhydria* they should be avoided.

For persons of *sedentary* habits, and for heavy *arthritic* eaters, as well as in *constipation,* their application will prove very useful, as they often serve to prevent overeating, act gently on constipation, and mineralize and alkalize the system.

Sorrel and *rhubarb* might just as well be counted among the fruits. The high percentage of oxalic acid is their particular quality. All contraindications enumerated under the head of spinach apply here with double force. Stomachs that are overworked or in an irritable condition cannot stand their acidity.

VEGETABLE FRUITS

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Eggplant (Aubergine)	1.07	0.22	5.30	0.39	28
Melons	0.68	0.12	6.38	0.36	30
Tomatoes	0.76	0.32	3.90	0.38	22

Eggplant has not yet become a very popular food; *melons* are bad for *diabetics,* and, as they are apt to relax the bowels, they should not be recommended to persons with a sensitive and irritable digestive apparatus; but if they are thoroughly matured, *dyspeptics* may partake of them in small quantities without experiencing any subsequent inconvenience.

The *tomato* has an acid taste, on which account its use in *arthritis* has for a long time been considered obnoxious. But Gautier has, by very careful experiments, demonstrated that the tomato contains but slight traces of oxa-

lates, and that the ash is decidedly alkaline. Therefore no reason exists why *arthritic, gouty,* and *anemic* individuals should not eat tomatoes without unpleasant consequences. In *dyspepsia* and *hyperacidity,* however, they should be removed from the menu, unless they form a mere admixture to sauces.

Gherkins and *capers* we look upon more in the light of condiments than vegetables. In *hyperchlorhydria* and *enterocolitis* they are prohibited. But they may render good service in *dyspepsia* from *insufficiency, chronic gastritis,* and in *anorexia,* in *tuberculosis,* and *anemia.*

Mushrooms

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Esculent boletus......	4.00	0.32	0.50	0.60	22
Champignon, raised in mushroom beds.....	3.57	0.20	1.00	0.70	21

In spite of their nitrogenous compounds, they possess but little alimentary value and serve generally as seasoning only. While their savory qualities provoke gastric secretion, they do not agree with delicate digestive organs. Xanthic bodies are plentiful, and toxic elements are present. Hence they cannot be allowed in *ar-*

thritis and similar conditions, neither in *albuminuria,* nor in affections of the *heart.*

Fatal accidents, superinduced by the ingestion of poisonous mushrooms, are so frequent that it is needless to dwell on them here. It is often very difficult to distinguish between edible and poisonous mushrooms, and even the good ones may have a toxic effect on predisposed and enfeebled persons.

If truffles do not in every instance cause poisoning, they nevertheless fall under the same restrictions which we have mentioned before, especially for *gouty* patients.

FRUITS

Fruit was no doubt one of the original foods of primitive man, and even now, among the ancient races, still claims the place of honor. After vegetarianism, in which extensive use is made of it, we have heard a good deal lately about fruitarianism, the believers in which pretend to content themselves with fruit alone as a diet.

We will not enter here into a discussion about the specific merits of these two doctrines, but will confine ourselves to the remark that we cheerfully admit the excellent value of these products of nature as a proper aliment; also, that with the qualities possessed by them, it is quite possible to correct or neutralize the evil effects emanating from the many bad habits that taint our diet.

It would be a matter of great satisfaction, indeed, if the companies and trusts that are interested in the supply of fruits were to arrange the

prices so as to enable the denizens of towns and large cities to use them more freely.

For the purposes of our study we divide the fruits into three classes, according to their composition and different characteristics, viz.: 1, watery, acidulated fruits; 2, those that contain sugar, properly speaking; and 3, amylaceous, or oily fruits.

WATERY, ACIDULATED FRUITS

COMPOSITION AND FOOD VALUE

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Apricots	0.81	0.11	13.74	0.44	61.00
Cherries	0.95	0.67	16.31	0.41	77.00
Lemons	0.33	0.33	9.62	0.26	44.00
Quinces	0.94	0.62	25.00	0.35	113.00
Strawberries	0.81	0.50	8.72	0.48	44.00
Raspberries	0.67	0.93	13.39	0.38	62.50
Gooseberries	0.68	0.48	13.14	0.55	61.50
Oranges	0.51	0.22	11.38	0.34	51.00
Peaches	0.77	0.43	14.18	0.43	65.50
Apples	0.25	0.26	14.17	0.29	62.00
Pears	0.43	0.26	14.50	0.32	62.00
Plums	0.62	0.31	17.10	0.44	76.00
Grapes	0.96	1.25	18.34	0.32	91.00

It is obvious from these data that water represents about four-fifths of the weight of this

class of fruits, to which is due their refreshing nature and their strong power to quench the thirst, thus acting as substitutes for tonic beverages or hard and soft drinks.

According to Pascault the water contained in fruit possesses particular properties and enjoys a special vitality, an electric reaction analogous to that of mineral waters when taken at the springs.

This much is certain, that the special properties of fruits rest in their watery contents.

Albumin and fats are small in proportion. Fruits are the least nitrogenous of our aliments.

Carbohydrates form the only caloriferous principles. A little more abundant than in the green vegetables, and in composition less varied, they consist almost uniformly of glucose and levulose in equal parts, and a small percentage of saccharose. The latter is diminished in proportion to the ripeness of the fruit. We may add a small compound of gum and of pectic matter, which in the boiling forms the jelly; and of ether, to which the fruits owe their pleasant and distinctive aroma.

Cellulose is very lavishly present, averaging

often one-twentieth of the total weight, or one-fourth of the dry extract.

Free acids and acid salts (malate, citrate, tartrate, fumarate) are plenteous, whence their real acidity, so easily discovered by the taste, is derived. After absorption these organic acids are burned up and transformed by the economy into carbonates, which alkalize the juices. Hence fruits, when being ingested, are acid, but in the process of assimilation and elimination become alkaline. On account of the small percentage of ash their mineralizing power is also very small, ranging after green vegetables, legumes, milk, eggs, and certain cereals; but preceding meat, fish, bread, pastry, and rice.

Potassium and sodium constitute about 50 to 60 per cent of the ash. Phosphorus is wanting; lime and iron are a little stronger. Sodium chlorid oscillates between 0.01 and 0.02 per cent.

The alimentary value is naturally low, except in grapes, 100 grams of which will give 100 calories. The merit of watery acidulated fruits is to be found in the high percentage of water and cellulose, and of alkalinity.

METHODS OF PREPARATION AND EMPLOYMENT

Fresh, natural fruit holds its laxative, antiscorbutic properties, for which reason it is best to eat it in that condition. But it should be always carefully washed and peeled, thereby removing a very liberal and noxious flora of microorganisms. Its digestibility depends largely on the state of ripeness. Immature pears and plums, for instance, will frequently cause diarrhea and dysentery. The state of preservation, however, is, on the contrary, a matter of secondary consideration. It is by no means an established fact, that mellow pears, for instance—that is to say, fruit advanced in age—is worse for the stomach than when quite fresh.

Cooked fruit is very easy to digest, and can be eaten to advantage by a large number of *dyspeptics.* Peaches, unpared, just steeped for two or three minutes in boiling water, form an ideal food for irritable stomachs. In intermittent fever a fruit-broth made of apples, cherries, grapes, bayberries, and prunes is most effective and beneficent. Ewald gives the following recipe:

"Pass hot gruel through a strainer, add sliced plums (or any other fruit), sugar, and a pinch of salt. Boil anew until the fruit becomes tender."

Fruit, fresh or cooked, does not keep well. Although hundreds of methods and means for preventing its rapid decay have been advanced and recommended, none has so far given the same satisfaction as sterilization. Put the fruit, either with or without sugar, into a preserving-jar, screw the lid well down upon the rubber ring, place the jar for one quarter of an hour in boiling water, being careful not to let the water reach the cover of the jar. The heat will sterilize the fruit completely. As the air in the jar cools off it forms a vacuum, and hermetically seals the lid.

The prevailing methods of preserving fruits are to boil them, with an addition of sugar, into a jam or syrup, which is kept in air-tight jars or bottles. These preparations are easy enough to digest, and the large content of sugar increases the nutritive power; but they incline to provoke gastric or intestinal fermentation and putrefaction. Children, particularly, are apt to overeat themselves on them by reason of the

sweet taste. Proper vigilance in their diet, as well as in that of *arthritics*, is therefore required. In *anorexia*, and in conditions of *general debility*, they serve an excellent purpose. Fruit jellies, due, as we have already said, to the cooking of the pectic contents so abundantly present in certain fruits, are especially easy for even delicate stomachs. Some fruits (apricots and pears) are treated by a process called desiccation, which strongly enhances their nutritive power, as the percentage of water falls from 85 to 33, and even to 30.

The juices, lemonades, and syrups made from fruit are all to be recommended to the healthy, as well as for generous use in the sick-room.

REACTIONS

a. *Digestive.*—There is a strong resemblance here to the green vegetables, as has already been forecast by the analysis. The action, however, is twofold, and at the same time opposite. By essence, taste, odor, and acidity it is both physical and chemical, which gives them the quality of condiments as well as of aperients; while the large percentage of cellulose, on the other hand, retards the process of digestion, and

even may irritate the stomach. In both instances the effect is more pronounced than in the legumes.

The same similarity may be observed in the intestinal reaction. Cellulose here again acts and stimulates peristalsis. When it is present to excess, or when the fruit is ripe, it irritates and ferments and engenders diarrhea, the more so if the canal is enfeebled and in an irritable condition.

b. *General.*—Since they contain nothing of a toxic or stimulating nature, being composed of salts and ternary elements only, fruits exercise the beneficent effects of a cleansing, eliminating, and disinfecting character on the whole organism, this being entirely due to the high percentage of water and alkalines, for which reason they are, as it were, an antidote to meat. Besides, they possess a special antiuric value. Not only do they dissolve uric acid, but they also inhibit its formation.—(*Ioteiko.*)

This reaction pervades the whole system, but particularly affects the circulation and the liver, the functions of which are largely moderated by it.

c. *Renal.*—The kidneys are relieved in the

same proportion. Elimination through them requires no exertion, oxidation is accelerated, and the cellular tissue is protected from deterioration.

INDICATIONS AND CONTRAINDICATIONS

Fruits alkalize the fluids of the body, increase combustion, disinfect and favor elimination. All these properties render them a choice food in *arthritis* which, after all, is only a state of hyperacidity, with small powers of combustion and elimination, but strongly inclined to autointoxication. Their limited nutritive power guards against superalimentation, and the cathartic efficacy enhances their utility in every division of arthritis.

Gouty persons had better beware of them, unless intestinal tolerance has been well established.

In *uricemia* and *urinary lithiasis*, likewise in *liver* complaints, they are prohibited. In chronic *rheumatism* their use should be restricted to lemons only.

Diabetes requires special consideration. If fruits are alkaline, and if their carbohydrates consist chiefly of levulose, they, nevertheless,

contain a large quantity of glucose and saccharose, which cannot, as is the case in green vegetables, be eliminated to any degree by cooking without loss of taste and flavor. The best advice is to use them in moderate quantities, with due regard to the percentage of sugar and the degree of tolerance which can be thus tabulated:

Bilberries, whortleberries, lemons, gooseberries, oranges, raspberries, strawberries, plums, peaches, pears, apples, grapes, quinces.

It is well to remember that all stone fruits contain the smallest amount of sugar just before they are entirely ripe.

In *acetonuria*, menace of *coma*, fruits containing citric and acetic acids may be recommended without hesitation, as they contain antiacetonic properties.

Among the illnesses in which a fruit diet will prove especially beneficial we may mention *nephritis*, diseases of the *skin* (with a few exceptions), and *fevers*. In all these cases soups, broths, and juices of fruits have their proper place, above all, if there is a tendency to constipation, as in *meningitis*.

Diseases of the *heart* and of the *blood-vessels* may just as well be added to this list. But, if

the cardiac muscles are enfeebled, peeled fruit cooked or in the form of jelly, is preferable, because it puts less strain upon the action of the heart and of the intestines. In *atheroma*, fruits rich in citric acid must be prohibited, because they increase the chalky deposit in the tissues and the calcification of the arteries.—(*Loeper.*) For the same reason Ferrier is against the use of oranges and lemons in *pulmonary tuberculosis.*

In *gastrointestinal* affections it is difficult to establish a fixed rule, and extreme caution is required. The same may be said about *dyspepsia,* with *atony* of old standing; likewise about *dilatations* with putrefaction. Some cases will tolerate jams, others cooked fruit with sugar, still others fresh fruit, eliminating, however, such as are too acid or too rich in cellulose.

In *hyperchlorhydria* non-acid and thoroughly ripe fruit may be tolerated. Similar effects will be observed in *anemia* and *dyspepsia,* on account of the aperient virtue contained in fruit.

In *intestinal affections* fruit must be forbidden whenever there is exaggeration of peristalsis, irritation or inflammation of the bowels. It is a matter of common knowledge that in *enteritis,* and in all cases of *diarrhea,* the use of fruit will

cause a reappearance of the symptoms; but this refers only to raw fruit; when cooked, or in the shape of preserves, the juice of fresh fruit does not fall under this ban; in fact, jelly of quince is a well-known remedy for these maladies.

In recent years some exceptions have been made in this direction; for instance, cures have been effected with fruit (banana-paste or strawberries) in cases of simple *serous diarrhea,* so prevalent at times in hot climates. The banana-paste acts through the antiputrefactive quality of its carbohydrates. The action of the strawberries is as yet difficult to define.

It would appear reasonable to assume that, inversely, fruit would constitute an exceptionally strong remedy for *constipation.* But the problem is rather complex, for we must not lose sight of the fact that, if cellulose affects intestinal peristalsis, it may also cause fermentation and aggravate the very trouble it was intended to combat.

In simple *idiopathic constipation* of heavy eaters, in *arthritis* and persons of *sedentary* habits, marvelous results will often follow the use of fruits. It often happens, too, that with the cos-

tiveness the hemorrhoids, so common among this class of patients, disappear also; for they regulate peristalsis and circulation alike.

In *enterocolitis* they are not so well borne, and may give rise to irritation, and even spasms. If at all, they should only be administered either cooked or as preserves, fresh fruits being reserved for light attacks, or convalescence.

If *constipation* is due to atony or enteroptosis, much prudence is required; the dilated and fatigued intestines have need for a food which leaves less residue—in fact, for a gastric rather than an intestinal diet; and all fruits belong decidedly to the latter. But, if used at all, then only when absolutely ripe and after the peel or skin and all the seeds or stones have been carefully removed.

Fruit possesses, moreover, another distinct advantage of great social import. The water which it carries into the system diminishes the desire for drinking-water and alcoholic beverages. Foster has proved that the consumption of alcohol decreases in direct ratio to the increased consumption of fruits. In the war against alcohol, which is so conspicuously being waged nowadays, this factor should play

a prominent rôle, and proper means should be adopted for a plentiful and cheap supply of fresh fruits among the masses.

The manufacture of non-alcoholic wines from grapes is a step in the right direction. Every effort should be made to make these products more and more popular.

PARTICULARS

Apricots are remarkable for their high acidity, which restrains their use, however. But this inconvenience disappears when given as preserves or compote.

Whortleberries, *bilberries*, and *cranberries* are highly prized for their astringent and antiseptic properties. Combe makes large use of them in *enterocolitis.* As preserves they render excellent service in cases of *gastrointestinal* embarrassments, chiefly in *diarrhea.*

Pineapple is very easy to digest. It is very rich in cane-sugar.

Cherries possess a large amount of cellulose, especially in the skin, which cannot be removed. The sick should only eat them cooked. Mineral substances, preferably iron, are prominent. A diet-drink made of cherry-stems has a

diuretic effect exactly within an hour after consumption. Many cases of gout will yield to a cherry cure, since the uric acid is changed into hippuric acid; but a constant watch must be kept for the appearance of symptoms of intestinal trouble.

Quinces are so rich in cellulose (they contain three times as much as cherries) and tannin, that they cannot be eaten raw, but only in the form of marmalade, jelly, or jam, with plenty of sugar. In *diarrhea*, especially in the serous form, they act as an astringent and a tonic. In the normal person a too free use of them will bring on constipation.

The *lemon* occupies, among the fruits, a place of its own, and is of great therapeutic value. Citric acid is refreshing and stomachic. Lemonade is a most wholesome drink, and withal most popular. Sucking the juice of a lemon refreshes the system in a marked degree, especially on hot and exhausting days.

For *dyspeptics* who are debarred from the use of spices, vinegar, and aromatic substances, the lemon furnishes an agreeable and hygienic seasoning, which can be employed in a hundred different ways. As it is almost entirely devoid

of carbohydrates, *diabetics* should turn to it with predilection.

As an antirheumatic it deserves special attention. In *acute articular rheumatism* it is of doubtful value; but in *chronic rheumatism* it is an unmixed blessing. The diet should consist of six to eight lemons a day. Stronger doses are apt to tire the stomach and to favor the development of arterial atheroma by depriving the tissues of their chalky constituents. If the latter be the case, the lemon must be eschewed, likewise in tuberculosis.—(*Ferrier.*)

We must here call attention to the so-called antihydropic virtues, which are of doubtful merit, and to the antiscorbutic value, which is unquestionable. In *Barlow's* disease it often suffices to add a few drops of baby food in order to prevent an accident.

Strawberries contain very little cellulose, but masses of seeds which make them rather hard to digest in *dyspepsia*, except when cooked or preserved. As the sugar content is relatively low, *diabetics* may eat them in fairly large doses. Of all the acidulated, aqueous fruits they are the most highly mineralized. There is an abundance of sodium, of lime, and of iron (as much as

in lentils). Hence, they are a splendid food for anemics and demineralized persons. The strawberry cure, which, according to Gruebler, equals the grape cure, is of particular value in "*plethora, biliousness, gravel,* and *gout.*"—(*Martinet.*)

From 300 to 500 grams is the standard dose. In certain cases of *chronic diarrhea,* in hot climates, two to three pounds of fresh strawberries per day should be prescribed.

In *eczema, urticaria,* and in all *skin* diseases they are forbidden, because they contain a salicylic element which is very irritating.

Raspberries are inferior to strawberries, inasmuch as they contain three times the amount of cellulose and less ash. Gruebler claims for them antihemorrhagic properties.

Gooseberries are extremely aqueous (93 per cent of water to the pound). The taste is strongly acid (citric). The abundance of skin and seeds makes them heavy and irritating to the stomach and the intestines. But in the shape of jam or jelly they are excellent. They contain only 4 per cent of sugar, hence should be the favorite fruit of *diabetics.*

Mandarins are almost identical in composition with the orange, but approach the lemon

more than the latter, being richer in citric acid and poorer in sugar. They share also the same good and bad qualities, although in a smaller degree.

The juice of the orange possesses a strongly marked flavor, and is often used for masking the taste of castor-oil.

The *Peach* is one of the choicest, most delicately flavored fruits; but, being rather rich in cellulose, *dyspeptics* should not partake of them except as compote, or when cooked in the skin.

Pears are a heavy food, rich in cellulose and hard for delicate stomachs, unless they are cooked. Dried pears have a high nutritive value, 257 calories in 100 grams.

Apples show the same disadvantage. The percentage of magnesium is double that of lime, for which reason they suit patients suffering from *oxaluria.* Certain authorities claim anti-uric properties for them which should prove useful in *gout.* Weiss maintains that the apple only reacts when eaten with the skin, on account of the picric acid present therein.

Plums and *prunes* are of slow digestion and often the cause of diarrhea. Dried prunes are

a good remedy for constipation. Prunes with senna are a mild purgative, and worthy of recommendation.

Peaches, pears, apples, plums, and prunes contain malic acid. Sugar is bounteous enough to exclude them from the table of the *diabetic.*

Grapes reach the highest zone of all the properties recognized in fruit, generally speaking, for which reason they are preferred in medicine for the purposes of cure. The percentage of acidity is moderate, but varies somewhat in the different species. It decreases with the age of the grape in the same ratio in which sugar increases. The latter is nearly all glucose, and exceeds in quantity that of any other fruit. Saccharose, dulcite, and mannite are but slightly represented.

If ingested in small portions only, grapes agree with almost every kind of illness, but it is necessary to warn the patients, especially those suffering from *indigestion* or *enterocolitis,* to carefully spit out the skin and pips. We make two exceptions here: *diabetes,* on account of the prevalence of glucose, and *diarrhea,* on account of their laxative action.

The indications for a true grape cure, which

consists in the consumption of from two to four pounds of grapes a day with a corresponding reduction of other foodstuffs, are naturally very limited. It is largely practised around the Lake of Geneva, but can be undertaken anywhere with well-matured and mellow grapes.

The following rules are generally observed:

One-half the quantity prescribed is taken about noon, an hour or so before luncheon, one-fourth an hour after luncheon, and the last one-fourth an hour after the evening meal. Certain precautions must be observed, if this large volume of food is to be well tolerated. 1. The grapes must not be eaten too cold; 2, they must be previously washed to remove the sulphate of copper coating; 3, they must be eaten very slowly and thoroughly masticated, skin and pips being carefully rejected; 4, after each dose physical exercise must be taken; 5, moreover, it is wise to begin with a smaller dose, say one pound per day, which can be easily increased until the maximum of four pounds has been reached. Since four pounds of grapes represent about 1,800 calories, the necessity of reducing very materially the rest of the diet will be apparent. Haussmann suggests total abstention

from beer, meat, fatty fish, salads, and coarse bread during the cure.

The following symptoms should be carefully watched: Stomatitis caused by the hyperacidity of the grapes, attacks of dyspepsia and of diarrhea. If any of these should manifest themselves, the daily ration should be reduced. It very rarely becomes necessary, however, to interrupt the cure altogether on account of any of these events.

This diet at once involves the intestines, the liver, the kidneys, and nutrition in general. Hence, the indications can be given with precision. As the action on the bowels is loosening, the cure is effective in *constipation.* Especially in people of *sedentary* habits, in *superalimentation* and *abdominal plethora.* *Hemorrhoids* rapidly improve under it, but only when stomach and intestines are robust and vigorous. The *liver* experiences an excitation like to the cut of a whip, which stimulates all its functions, especially the bile secretion. In *lithiasis* and *hepatic* congestion, unless complicated with *alimentary glycosuria,* it proves of much benefit.

The urine becomes more abundant, more alkaline, but poorer in uric acid under this treat-

ment, which produces also very happy results in *uricemia*, *gall-stones*, in *chronic catarrhs* of the *bladder*, especially of old standing. But the digestive avenues must be clear and in good condition.

The intraorganic combustion is markedly accelerated by reason of the steadily increasing alkalinity of the somatic humors; in fact, a grape cure constitutes a veritable irrigation, a lixiviation, so to speak, of the whole organism, especially in *slow* and *toxic arthritis*. Whether it has an economic reaction on the nitrogenous bodies, on the fats and carbohydrates, is rather doubtful. We do not think that a cure of this kind can have the least beneficial effect on *tuberculosis*.

Raisins (dried grapes) show a heavy loss of water and free acids which, of course, increases the percentage of sugar. They are hard to digest, and unfit for delicate stomachs and intestines.

SACCHARINE AND NEUTRAL FRUITS

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Bananas	1.21	0.50	21.87	0.65	100
Dates	1.60	0.80	71.61	1.23	308
Figs (fresh) ...	1.12	0.24	18.09	0.43	81
Figs (dried) ...	2.89	1.22	61.52	2.09	276

These varieties of fruit form an homogeneous class, possessing the following characteristics, viz.: absence of acids, which gives them a peculiarly sweetish taste, a very high percentage of sugar, especially when dried or half dry; and a fairly high nutritive value, which is due almost entirely to their carbohydrates; but a feeble mineralization, with potassium and sodium predominating.

They form staple foods for certain tribes in Asia and Africa and the West Indies, and are an important food factor also in the United States and certain parts of Europe. Their anticostive qualities (especially of figs) render them particularly valuable.

Of course, in *diabetes* and *dyspepsia* of the stomach or of the bowels, they have no place, being much too hard to digest. Bananas may be excepted if made into a compote with plenty

of sugar and passed through a fine strainer, in which form they make a very nourishing dish, equally easy for the stomach and the canal of the confirmed dyspeptic.—(*H. Labbé.*) Figs and dates are emollient fruits.

OILY FRUITS

	Albumin.	Fats.	Carbo-hydrates.	Ash.	Calories.
Almonds (dry)....	17.60	49.00	17.00	1.60	605
Hazlenuts (Filberts)	13.50	56.00	12.17	1.91	636
Walnuts (dry)	14.06	52.06	15.48	1.24	619
Olives (green)	0.83	18.40	8.80	1.10	213

We might as well eliminate olives as a foodstuff, for they are used chiefly as a condiment, or savory only, and are very hard to digest. Their best quality is to be found in the oil which is gained from them, and of which we have already spoken.

The other fruits, however, belonging to this category are an exceptionally valuable nutritive coefficient by reason of their very high nitrogenous components. With the exception of butter, oil, and animal fats, they leave the other foods far behind, surpassing in nutritive power even cheese and beans by one-third. The great drawback is their indigestibility, especially when

eaten in large quantities. They represent simply a lump of cellulose, abundant and compact, which makes them, despite the most careful mastication, a rather tough proposition even for robust stomachs, and quickly provokes that feeling of fulness and satiety characteristic of nuts. Even inveterate vegetarians are beginning to recognize this fact and to use them only when finely grated. Upon arriving in the bowels their action is doubly laxative, owing to a surcharge of cellulose and oleaginous principles. We take leave to point out the larger percentage of nitrogen and the complete absence of xanthic bodies. Also, that, like cheese, they furnish a considerable reserve of albumin quite free from purins.

Generally speaking, they are fit enough for robust and healthy constitutions, quite suitable for navvies and persons engaged in manual labor or dwelling in frigid zones.

In *pathological conditions* their use is very limited, and almost exclusively restricted to *diabetics*, for whom they form—being both nutritive and almost free of sugar—an ideal substitute for bread. The "almond breads," however, sold in the market, are too heavy and too solid, apart

from having a disagreeable taste and being very indigestible. We prefer the almond cakes prepared after de Goff's formula, viz.: 250 grams of shelled sweet almonds are pulverized in a mortar, 2 eggs are added, together with 2 grams of bicarbonate of soda and 1 gram of tartaric acid. Triturate and mix carefully. Pour the paste into a mold and cook for twenty-five minutes. This will make a cake weighing 300 grams, sufficient for one meal and containing only 5 to 7 per cent of carbohydrates.

Dyspeptics should shun all these fruits the same as any other indigestible food. In *arthritis* and *obesity* they had better be forgotten, for they are too replete with nutriment.

CONDIMENTS

UNDER this name we comprise a number of substances of spicy taste which are added to our foods for the purpose of either changing or improving their flavor. They form the most important basis of what we call "the kitchen," and to them are due, in a large measure, all the advantages, as well as the inconveniences, of our cooked foods. For, if dispensed without reason and judgment, with a free hand as it were, they do harm; but, if employed in moderate quantities, they serve a useful purpose, and in some instances become even a matter of necessity.

The advantages of condiments are in favor of digestion. Most of them appear to stimulate the action of the stomach and of the intestines by direct chemical action; although this is doubted by some and absolutely decried by other authorities. At any rate they seem apt to provoke a certain amount of irritation. Nevertheless, we must admit that they sharpen the appetite by adding zest to the dish and thus

exciting the psychic secretions, the importance of which has been demonstrated by Pauloff's researches. In this, no doubt, consists the sum total of their utility, which is chiefly of an antiseptic nature, indirectly stimulating the normal secretions, and directly acting by their essential oils (salt, garlic, mustard, etc.).

They may be looked upon as agents of assimilation and economy, though, with the exception of salt, this is a matter of secondary consideration.

Most of the condiments are not foods in the strict sense of the word, inasmuch as they do not cover our needs of energy or of mineral principles. We except salt and sugar, the former being indispensable for maintaining our mineral equilibrium, and the latter being the most useful factor in the production of muscular force.

SALT

Sodium chlorid forms the chief constituent, and is accompanied by certain very valuable impurities, such as bromid, iodid, arsenic, and fluor. The composition of the salt gained from saline waters differs but little from that of the

rock salt taken from mines. Both undergo considerable changes in the process of refining. The fine table salt contains less iron and arsenic than the coarser kitchen salt, and for that reason is perhaps less hygienic. Sea salt particularly excites the gastric secretions.

Sodium chlorid is the one mineral principle in which nearly all our foodstuffs are deficient, and has to be added at the rate of from 6 to 8 grams to our daily rations.

Recent research seems to have proved to satisfaction that the hydrochloric acid of the gastric juices is principally derived from the sodium chlorid ingested with our food, and not from the salt contained in our blood. Salt is, therefore, an essential condition for this secretion. For the bowels it is of smaller importance, but it maintains equality of tension of the blood (isotonia). If taken in overlarge quantities it provokes hypersecretion and diarrhea.

The effect of salt on the nutrition is considerable. It contributes much to the stability of vascular pressure and the general tone of the organism, and facilitates the changes in the tunica intima. The small molecules of sodium chlorid are, so to speak, the small change which

serves as a medium between the double currency passing from the cellular tissue to the plasma, and vice versa from the plasma to the cells. It exercises over the process of nutrition an influence of economy and moderates the movement of nitrogenous disassimilation, bringing about at the same time the oxidation of the unassimilated substances (coefficient of oxidation).

Some authorities invest it also with the power of forming hemoglobin and red blood corpuscles.

For all these reasons, sodium chlorid, the protector of the isotonia of our body fluids, should be kept on a steady level within our economy. Bunge goes so far as to claim that this cannot be accomplished except by the absorption of a stated daily ration. In effect, our daily food, especially the vegetables, carries into our system a notable amount of the salt of potassium, which splits the sodium chlorid into potassium chlorid and sodium phosphate, both of which are eliminated like foreign bodies, thus establishing a serious loss in sodium chlorid which it should be the task of alimentation to supply.

Salt is also an important factor in the renal secretions. Not only does it augment the aque-

ous diuresis, but also the solid residue. Sodium chlorid is the active means "by which the kidneys eliminate the greater portion of unassimilated substances, such as urea, the complex amins, the leucomains, etc., and the glucose in diabetes, no matter whether these bodies form a direct union with the salt or whether the products of decomposition of the tissues are disintegrated and carried off by the sodium, such as the biliary acids and the original sodium of the salt itself."[1]

This discussion would be incomplete if we were to neglect to make proper mention of the injuries done by the accumulation of salt in our tissues. Archaud and Loeper, and Widal and Javal, have dealt exhaustively with the frequency of its occurrence, which often favors the formation of œdemata that infiltrate the whole cellular tissue and the serous cavities, and finally involve the canal and the process of nutrition itself. In rare cases the retention of chlorid is dry, causing hypertension and cardiac fatigue, as well as sluggishness of the pulse.—(*Enriquez* and *Ambard.*)

In both conditions the renal functions are af-

[1] A. Gautier, loc. cit., p. 386.

fected, and it is quite true that, if the normal kidney requires salt for normal action, salt is poison to the pathological kidney, involving proportionate serious damage. For the healthy person salt is a necessary adjunct, the more so if vegetables form a large item of the diet. The only tribes (Tounguses and Ostiacs) known to eschew it, live almost exclusively on meat.

Too much salt is injurious. Diseases such as *nephritis* follow in its wake. In some diseases it is permissible to force the daily allowance a little; for instance, in *tuberculosis*, *scrofula*, and *lymphangitis*, in *dyspepsia* from *insufficiency*, and in *hyperchlorhydria*. According to von Noorden salt will serve a good purpose in *gouty* affections by speeding the solution of uric acid.

A dechlorhydrated regimen is indicated in a number of cases. In *nephritis*, especially in *œdematous* nephritis, it has been adopted by Widal with gratifying results. It often brings about a rapid resorption of œdematous growths, and permits of constant changes in the diet of the patient by varying slightly salted with unsalted dishes. In *dry nephritis* with hypertension, improvement is less marked, as the retention of chlorin is smaller.

Nevertheless, it is always advisable to give it a trial. To judge from these facts, a dechlorhydrated regimen ought to prove efficacious in *scarlatina*, as the advantage of a varied diet ought to forestall renal complications. The question, we think, deserves further study.

These reflections should encourage us in adopting the same regimen in *dropsy*, in *cardiac* diseases, in *hepatic* affections with *ascitis*, and also in *infectious phlebitis.*—(*Chantemesse.*) In the first two cases it has proved useful, although not curative. In the latter case the results are uncertain. The same observation has been made in *arterial hypertension*, *hyperchlorhydria*, and in *obesity* (*Labbé*), in all of which the effect has been of unequal value, causing *anemia*, *anorexia*, *emaciation*, and *inadequate nutrition.*

SUGAR

We shall deal here only with saccharose, or cane-sugar, such as is ordinarily employed in every household. This is a disaccharid, which splits into glucose and levulose. The consumption of sugar has attained enormous proportions in all civilized countries; and, from the hygienic standpoint, is an important factor in our bill

of fare. As a condiment sugar stimulates the appetite, for which reason it seems to appeal strongly to frail constitutions. To children it should be given in moderate quantities only, as they rather require a given proportion of salty foods. Only a little of it is retained by the stomach, although its sweetness flatters the palate. In the bowels it is dissected by the acids of the intestinal juices and absorbed *in toto*, without leaving a residue, thus favoring constipation. In concentrated solutions it is prone to irritate the gastric mucous membrane, and, if eaten in overlarge quantities, it may give rise to an acid fermentation along the whole of the gastrointestinal tract. When once it has entered the general circulation, it infiltrates the hepatic cellular tissue, and is warehoused there in the form of glycogen.

Combustibility bestows upon it a calorific value, almost equal to that of albumin; but, as the organism utilizes only the glucose, no chemical changes take place, for which reason it may be considered superior to starch, which requires a much more thorough digestion. Its isodynamic coefficient is 397 calories per 100 grams.

An attempt has been made to attribute to

sugar a diuretic action; but, whatever there is of it, is rather feeble and indirect and provoked by means of hepatic excitation. *Beet sugar* is an excellent food for healthy persons, especially those engaged in manual labor. The working-man will derive from it as much or even more power than from meat; besides, it is less expensive and less noxious. Experiments made on horses and men have proved sugar to be of great value when strenuous and prolonged physical efforts were demanded.

Troops also, engaged in fatiguing field exercises, are said to have been much benefited by a generous sugar diet.

As a fattening medium it possesses undoubted merit and should be recommended to all who are under the necessity of keeping their physical reserves in special repair, especially when the appetite requires a stimulating agent. But we warn against excessive use, for fear of consequent fermentations.

Patients suffering from gastric or intestinal putrefaction in *atony*, *stasis*, or *gastrecstasis*, or from *skin* diseases, especially *acne* and *furunculosis*, should heed this advice. In *arthritis* sugar often becomes a factor of superalimentation. In

obesity and *liver* complaints extreme caution is indicated. In *gout* it only proves dangerous when eaten together with meat, in which case the acid fermentations impede the elimination of the uric acid, whilst a vegetable diet has the opposite effect.—(*Ioteiko.*)

It goes without saying that in *diabetes* it is interdicted. To meet the hardships coupled with this absolute prohibition, certain substitutes are manufactured nowadays which, though they possess the taste of sweetness, yet are devoid of all the inconveniences attributable to sugar. Foremost among them are saccharine (benzoic sulphinide acid) which is quite harmless and two hundred and forty times as sweet as cane-sugar; and dulcine (paraphenol-carbamid), two hundred times as sweet as cane-sugar, but of which not more than 50 centigrams per day may be consumed with safety.—(*Von Noorden.*)

In former days *honey* was more in common use, in the pharmacy as well as in the kitchen, when the price of sugar was so much higher than it is to-day. It consists of almost equal parts of glucose and levulose, with a small percentage of saccharose and some aromatic substances and coloring matter. The available calories are 230

in 100 grams. On account of a slight preponderance of levulose it proves to be harder on *diabetics* than cane-sugar. But its laxative and antifermenting properties render it excellent in food value. As a purgative for children of tender age it is admirable.

OTHER CONDIMENTS

In the kitchen a whole series of substances are employed which have been styled by Gautier as, 1, *aromatic condiments,* i.e., vanilla, cinnamon, cloves, chevril, parsley, bay-leaf, etc.; 2, *acrid* or *peppery:* common peppercorn, ginger, allspice; 3, *alliaceous* or *allylic:* onion, mustard, horseradish; 4, *acid:* vinegar, capers, gherkins, citron; 5, *condiments* of *animal origin:* anchovies, caviar.

Their food value is either *nil* or exceedingly small, yet they possess properties of which we have already spoken. They stimulate the appetite, and consequently the digestive functions; their action is antiseptic, especially the aromatic species, such as garlic and mustard. In the summer-time and in hot climates these condiments serve the purpose of rousing the torpid and sluggish digestive organs into useful activ-

ity, whilst among the poorer classes they aid in disguising dishes of doubtful freshness, and prevent accidents.

In certain diseases they may be employed with advantage.

In *diabetes* they help to digest the fats; in *chronic gastritis* and in *major atonies* their stimulating and antiseptic virtues need not be feared. The same is true in *chronic fevers* and in *tuberculosis*. For this reason, especially in the summer months, the "hors d'œuvres," or savories, are useful in *anorexic tuberculosis*.

Special mention may be made here of caviar by reason of its strongly marked lecithin phosphorous content.

It is well to bear in mind, however, that these condiments, when taken in small doses, are wholesome, but soon become noxious when ingested in large portions, because they force superalimentation, because their violent stimulation is superseded by a phase of corresponding depression, and because they irritate too much the whole digestive system—the stomach, the bowels, the liver, and the organs of elimination.

As too irritating and therefore ever to be avoided, we quote: red pepper, ginger, allspice,

red cabbage, and all varieties of sauces and pickles, whether of English or American origin. Among the less irritating, which may be taken with impunity but in moderate amounts, we enumerate: garlic, onions, capers, gherkins, mustard, ordinary black and white pepper, cloves, and vinegar. The others are harmless.

Certain morbid conditions are contraindications: *hyperchlorhydria*, *inflammation* of the *stomach* or of the *intestines*, *hemorrhoids*, *atheroma*, *kidney* disease, *cystitis*, *blennorrhagia*, *skin* diseases, *liver* complaints, *cirrhosis*, *lithiasis*, *jaundice*—in all of which pepper and allspice are specially harmful, as has been proved to satisfaction by long experience.

NERVE FOODS

THE term "nerve foods" is justifiable only in part; for, although the substances to which it refers primarily exert a stimulating influence on the nervous system, their value as a food is, with the exception of cocoa, almost *nil.* We are tempted to include them rather in the name of medicaments than of foods. But, since they form a part of the daily nutriment of the normal individual, we will give them due consideration here under the title of nerve foods.

COFFEE

It is used in all civilized countries to a large extent; and, we are afraid, often too freely. The berries of the coffee-tree are dried in the sun and come on the market in the shape of green beans. Roasting frees the essential oils, develops the aroma, and produces a partial caramelization. The roasted beans, when ground in a coffee-mill, are ready for infusion.

It is needless to give a quantitative analysis, as coffee possesses no alimentary value. Besides some nitrogenous matter, cellulose, sugar and dextrin, aromatic oils and fatty substances, and a few mineral bodies, among which potassium phosphate predominates, its essential principle is caffein, partially combined with a certain tannic acid (caffeotannic acid), which gives the coffee a slightly antiseptic property. Caffein is a trimethyl xanthin, and is closely related to xanthin, uric acid, and the purin bodies. The absorption of coffee increases, therefore, the production of urinary uric acid.

A cup of coffee, consisting of about 100 c.c. and made with 15 grams of coffee, contains, according to Gautier, 0.26 centigram of caffein. It is important to know this proportion.

So far as nutriment is concerned, such a draught represents only 15 calories which may be raised to about 55 calories by adding two lumps of sugar (10 grams). Of course, coffee with milk is another proposition. The nutritive power is increased here in proportion to the amount of milk added. While the milk tempers the stimulating properties of the coffee, the latter adds to the digestibility of the milk.

It is worth while to understand the reactions of coffee on the system for the purpose of knowing how to use this article, because coffee is a nerve food, and possesses properties almost identical with those found in tea, cocoa, etc.

The action on the stomach is very slight and favors digestion. Cold coffee, with plenty of water, is a wholesome beverage and does not fatigue the stomach. In many cases of dyspepsia even fairly strong coffee is by no means deleterious. Its action on the general system of circulation is, perhaps, the most prominent, certainly above all vascular and nervous. Coffee heightens the tension, reinforces and modifies the heart-beats, raises the central temperature, and produces a feeling of warmth and comfort. It impresses the nervous system, both the cerebral and the muscular; it stimulates the power of activity and relieves the feeling of fatigue, compensating the loss of energy by increased circular activity. The writer can work with a clearer mind even into the small hours of the morning after sipping his cup of coffee; the laborer, the traveler, the merchant, all alike will feel renewed vigor and forget all about fatigue and lassitude.

The action of coffee may thus be defined: it augments the power to work, but in no wise modifies the consumption of calories or the organic wear and tear in a given task; it does not add to the productive power of the organism, nor in the least changes the relation existing between the calories utilized in the work accomplished and the calories lost by radiation. Coffee is by no means a food of economy. If some authorities admit that it diminishes, in a slight measure, the consumption of albumin, a large majority flatly deny it.

In this respect coffee, being neither a nutritive element nor a food of economy, is inferior to alcohol (taken in small doses), which possesses both qualities.

Résumé.—If coffee increases the power of production, it does so because it allows of a temporary abuse of the physical forces, but at the cost of a resulting bodily fatigue and increased organic expense, which must be compensated by a corresponding amount of rest and sleep.

Coffee is a diuretic and acts in a similar fashion to soup. As it produces uric acid, it is a strain on the renal capsules.

In its action on the organism, coffee obeys

the general law which governs all stimulants. Taken in small doses it assists the system in its functions, but in large doses it becomes toxic and provokes morbid symptoms. The symptoms of caffeinism are, briefly, the following: in the vascular system palpitation, sudden flushing of the face, anxiety, oppression in the region of the heart, general depression in the nervous system, insomnia, muscular weakness with trembling, and a general state of neurasthenia with inability to work.

Small doses of coffee will assist the workman engaged in manual labor, in fact, anybody who has to undergo fatiguing work or exercise. Alcohol has the advantage of being a food, in fact, a food of economy; but has the drawback of being more intoxicating. As an habitual tonic coffee falls behind beer, wine, and chocolate, which are nutrients and aliments of economy. It is ever risky to expect from coffee, for any length of time, the stimulation necessary for the performance of a given task which is beyond its powers. Unfortunately, a mistaken belief leads only too often to the abuse of this beverage, of which principally brain-workers render themselves guilty. But it is an error committed

by the working man as well as by the female worker.

In pathology coffee finds but few applications; chiefly as an antidote for morphin and opium, or in cases of acute alcoholism. It also renders good services in the struggle against chronic alcoholism, as it corrects the asthenia of abstinence. In surgery it is employed sometimes in spinal anesthesia with cocain or stovain, in order to prevent cardiovascular symptoms. In medicine, caffein in its pure state is preferred, as a rule.

Coffee is noxious in *cardiac* disease, in *angina, hypertension, scleroma,* in all diseases of *nervous* origin or those involving the *heart;* and, above all, to *neurasthenics*—those excitable creatures who forever fall back upon the abuse of this highly prized "Pick me up." *Dyspeptics,* and all those subject to *congestion* of the *visual organs* or to *varicosity* of the face, *acne rosacea,* or *psoriasis,* are advised to use coffee in moderation. Its close relationship to uric acid precludes its use in all cases of *uricemia, gout, liver* complaints, and *arthritis.*

Kneip's Malt Coffee, Postum Coffee, and similar preparations may act as substitutes for cof-

fee with people who can accustom themselves to their rather disagreeable taste, which, however, may be somewhat corrected by the addition of a third or a fourth of real coffee.

TEA

The use of tea is on the steady increase throughout the world, we think, for the general welfare of the people; for it is a most wholesome and hygienic beverage.

The dried and more or less toasted leaves contain nitrogenous extracts, cellulose, gum, dextrin, a fairly large proportion of oxalates, ash in which phosphate of potassium predominates, and, above all, its active principle, "thein" [trimethyl xanthin], similar to caffein but containing a larger percentage of tannin. Ceylon tea is somewhat stronger than China tea; it has a thicker and browner juice. The black teas which undergo a slight fermentation before being dried, contain a smaller amount of thein and tannin than the green varieties.

Although the composition is analogous, the dose of the active principle differs greatly. A cup of tea of 120 c.c. can be made with about 1 gram (a pinch) of tea, and contains 0.4 gram

of soluble substances, and only 0.025 gram of thein, or ten times less than a similar cup of coffee. Its nutritive power is *nil*, if we except the sugar and milk which are generally added.

The action of tea on the organism is almost the same as that of coffee, perhaps a little lighter.

Tea assists digestion; with rum it is used with effect in heart disease.

The large percentage of tannin makes it slightly binding.

The action on the kidneys and on the neurovascular system differs somewhat. Excessive tea-drinking is apt to provoke palpitation, vertigo, neuralgia, trembling, irritability, and emotional nervousness; yea, even symptoms bordering on epileptic conditions which only cease with the absolute suppression of this alkaloid.

Weak concoctions of tea make, nevertheless, a harmless, indeed, a useful beverage, especially in hot climates, as the water used for the purpose must of necessity be boiled, thus destroying impurities or any possible bacilli that may be contained in it.

Dyspeptics who prefer tepid or lukewarm

drinks derive much benefit from a cup of weak tea sipped warm during the repast, or cold after eating; but we must advise moderation, and under circumstances recommend, rather, infusions made from camomile or the blossoms of the linden-tree.

Five o'clock tea, or afternoon tea, so much in vogue in certain countries, is by no means wrong in principle. For people in good health it constitutes a useful repast, as it offers a welcome stimulant in the fatigues of the daily routine. If a small pat of butter or the yolk of an egg be added, it even becomes a nutriment. But one or two small cups must be the limit. The habit of gorging one's self with a mass of rich cake or pastry—in itself heavy and indigestible—washed down with three or four or more cups of tea, is bound to entail serious consequences and endless trouble.

So far as *contraindications* are concerned we can only repeat what we have already said under the head of coffee, laying particular stress on cases of *oxaluria.*

COCOA [1]

Chocolate and *cocoa* deserve special mention, as they are the only nerve foods which possess a real nutritive value. The cacao bean contains notable proportions of albumin, carbohydrates, and fats. In the manufacture of the powdered article a large amount of the fat (butter of cacao) is removed, until the following proportions are obtained:

	Albumin.	Fats.	Carbohydrates.	Ash.	Calories.
Powdered cocoa..	17	25	13	3.00	350
Chocolate	57	22	62	1.70	487

The carbohydrates consist principally of cane-sugar. The oxalates are very abundant, 4 grams per 50 kilograms. The ash consists of phosphate and sulphate of potassium and of magnesium.

The active principle, theobromin (dimethyl xanthin), which reacts very much like caffein, is less prominent in cocoa than in chocolate.

As for the rest, chocolate does not differ from cocoa, except that the percentage of sugar is

[1] We have adopted here the spelling in general use, "cocoa," well knowing that it would have been proper to follow the scientific spelling "cacao."—(Translator.)

higher (about 50 per cent). In chocolates of inferior quality, sugar is frequently supplanted by fecula.

A cup of sweetened cocoa made with 10 grams of the powder represents about 74 calories, and contains in the neighborhood of 0.13 centigram of theobromin and 0.045 of oxalates. A cup of chocolate made with 15 grams of the powder represents the same number of calories; it contains 0.19 centigram of theobromin, but only 0.012 of oxalates.

The physiological action of cocoa approaches that of coffee and tea very closely, but is moderated by the presence of fats and sugar, which make theobromin less stimulating than caffein. That is the reason why cocoa is borne better by dyspeptics than chocolate; but it ferments easily, and is binding, which is a drawback.

Vascular, cerebral, and muscular stimulation and diuretic action are less pronounced, but the general tonic action is stronger and more rapid. A cup of cocoa or chocolate promptly produces a feeling of comfort which, as Gautier so tritely says, can only be explained as "a nervous effect provoked by the flavor of cocoa, sustained by the tonic influence of theobromin, and completed

by the nutritive element of the food in direct ratio to the amount absorbed."

People who are engaged in *outdoor exercise* or *sport* should bear that in mind; likewise those who are *depressed* in spirit, *convalescents*, or *hypopeptics*. For *forced alimentation* a cup of chocolate with 150 c.c. of milk and the yolk of two eggs will do much. It represents at least 300 calories.

But chocolate should never be made the base of a diet. Excessive use is bad for the stomach and the bowels, in fact, for the whole system. Martinet quotes the case of a man sixty years of age who brought on a serious attack of generalized rheumatism by having lived on chocolate exclusively for several years.

Children are more sensitive in this regard than adults, and a special danger lurks in the circumstance that many farinaceous baby foods are flavored with cocoa.

Variot claims that children who are surfeited with cocoa are constipated, puffed up, flabby, frail, nervous, and peevish.

Cocoa is a food simply for sustenance, but not for development.—(*Guinon.*)

We warn here also against the too frequent

use of chocolate candies, which overload and obstruct the stomach and the intestinal canal, spoil the appetite, and cause carious teeth.

In *gout, gravel, uricemia, rheumatism, cardiac* and *Bright's* disease, *arthritis, arthritic constipation,* they are dangerous titbits. In *liver* complaints, *diabetes,* and *oxaluria,* chocolate must be rigidly avoided. Persons suffering from *diabetes* or *heart* disease may partake of cocoa in small doses, but never when sweetened with sugar. So far as the other categories of disease enumerated above are concerned, cocoa ranks even with chocolate.[1]

[1] Not so much on account of the chocolate, but of the impurities, such as paraffin, which they contain (so-called milk chocolate), and especially on account of saccharine and sugar.—(Translator.)

BEVERAGES

NATURAL WATER

WATER is the most necessary substance, without which man cannot endure for any length of time. Even when fasting for a period of days, we cannot exist without a given quantity of water. Of course, this is quite natural, for water is the principal constituent of our cellular system; and, being constantly eliminated through the kidneys, the intestines, the lungs, and the skin, it must be incessantly replenished by daily rations.

The normal human being excretes every twenty-four hours

1,500 c.c. of water through the urine,
60 c.c. of water through the feces,
900 c.c. of water through the lungs and skin.

Total....2,460 c.c.

Of this quantity about 1,400 c.c. are carried into the system by the food we eat, of which nearly 400 c.c. are derived from the oxidation

of the hydrogen contained in the foodstuffs ingested. So that we have to supply just a little more than a liter of fluid in order to satisfy the demand.

Moreover, physical exertion strongly changes and affects the elimination of water, i.e., on an average of

	1,000 c.c. through the urine,
	60 c.c. through the feces,
	1,900 c.c. through the lungs and the skin.
Total....	2,960 c.c.

The percentage of water contained in the food is subject to very little change, while the ratio required for work, oscillating between a liter and a half and two liters a day, must be maintained for the proper functioning of the tissues. It is true that the renal secretions act as a regulating force in this process of supplying moisture, being scant when the supply is small, but profuse when the proper measure is exceeded; also that cutaneous and pulmonary excretions play only a subordinate rôle in this game of compensation.

But it becomes a matter of urgent necessity that the natural laws should not be transgressed,

one way or the other. Drinking too little water is just as injurious as drinking too much. The former dries up the tissues and allows of an undue accumulation of toxic deposits, especially of uric acid, which may cause a lot of trouble. On the other hand, the latter soon degenerates into an evil habit, with all its baneful effects on the heart and circulation, by supplying a plethora of watery elements; and on nutrition, by retarding its progress and leading to obesity.

A thorough understanding of these laws will materially aid in finding the just proportion for the healthy individual, while it will also indicate the proper adjustment of the quantity of liquid required for different regimens.

There is, first of all, the *dry diet*—prized so highly in the major dilatations of the stomach—the aim of which is to avoid alimentary surfeit and the dilution of gastric juices, which precipitate putrefaction. The idea itself is all right enough, but it must not be pushed to the extreme; for, after all, in cases of dilatation or gastric fermentation, or even hypopeptic affections, it quite suffices to restrict the patient to a diet of thick soups and the smallest allowance of beverage during the meal, to effect a marked im-

provement. One small glass of water should be the limit, but that is always required for properly stimulating the appetite and forming the chyme needed for the process of digestion. Moreover, it is wise to drink a glass of water between meals when the stomach is comparatively empty, to support its action.

Restriction in the use of water forms a part of the treatment in obesity; it is the fundamental principle in Oertel's cure. Stout people should drink but little water, and never during meals. Less than a liter per day is the norm. But this again depends upon the fact whether the formation of adipose tissue is occasioned by arthritic or toxic matter. Oertel's cure does not agree with every individual case, and requires careful supervision and never-ceasing vigilance. A judicious restriction in the use of chlorinated substances will often prove to be of better advantage.—(*M. Labbé.*)

Patients suffering from *cardiac* troubles, or from *Bright's* disease, are likely to derive benefit from this selfsame treatment. If there is a tendency to drink often and much, it is prudent to restrict the daily ration to 1,500 c.c. without fear of restraining the proper flushing of the

kidneys. On the contrary, much comfort will be experienced in the heart's action and that of the renal capsules.—(*Widal.*) But, be it remembered, in order to obtain satisfactory results, protracted treatment is a *conditio sine qua non.* [1]

However, there are many morbid conditions which demand an excess of the normal quotum; for instance, *gout* and *uricemia*, which require large quantities of water for ridding the system of a surcharge of uric acid. But even here moderation is a hard and fast rule. Diuresis is always the criterion. One liter and a half to two liters is the average. Anything beyond that is a strain on the heart.

The term "natural water" applies to the natural product containing no mineral or chemical substances foreign to its essential organic or inorganic composition.

Genuine potable "table" water must be "fresh, limpid, free of odor, slightly alkaline, agreeable to the taste, easy on the stomach,

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[1] It is well to bear in mind that in pathological conditions the system absorbs only very minute quantities of water from the solid foods, so that 1,500 c.c. represents in reality only an inferior percentage of the daily allowance.

aerated, free from putrefaction, and fit for common domestic consumption."—(*Gautier.*)

We may, with advantage, dwell upon a few of these qualities. Aeration is conducive to digestibility; badly aerated waters press upon the stomach, not so much on account of the absence of oxygen, but because they are too much impregnated with organic matter, which easily putrefies and becomes injurious by absorbing oxygen from, instead of conveying it to the system. Chalk is another important factor. Good, healthy drinking-water should contain about 0.500 to 9.300 grams of mineral matter, and 0.300 to 9.100 grams of carbonate of lime per liter. This hydric chalk forms a mineral coefficient in our daily ration not to be neglected; and, if wanting, will seriously affect the constitution, especially in the young. If present to excess it will do harm, because it makes the water hard and unfit for cooking vegetables.

The most important quality of good drinking-water is sterility; in other words, water must be free from pathogenic microbes, above all—in the heated season. In the summer months infection is chiefly due to Eberth's bacillus, and special precautions are required to secure sterility.

Boiling has its advantages, but, unfortunately, it precipitates the essential salts. The filter is, perhaps, preferable, but it requires everlasting cleaning. Filters should be boiled at least once a week.

Natural mineral waters, if selected with caution, are all right enough for a certain period; but, if excessively used, they have their drawbacks also. They are really intended for morbid conditions of the body.

On the whole, the water provided by the municipal authorities of large cities is healthy and fit to drink, especially if the supply is carefully guarded against noxious infiltrations from surrounding sources.

Rain water, gathered in cisterns, lacks the necessary percentage of salts and mineral matters, and is apt to contain microbic substances. River water is, as a rule, contaminated, and therefore risky.

Water should be consumed during meals. To drink water only before or after eating we consider a bad habit, especially in persons of sedentary habits. But we recommend taking a glass or two of water before bedtime, to persons who are troubled with indigestion or plethora.

The man who toils requires more water between meals; but, if he can accustom himself to the habit of drinking only with his repast, he will be benefited by it.

To sum up, our drinking-water should be always fresh and cool, although tepid water will agree better with dyspeptics. Ice-water, or very cold spring water, is ever harmful.

ALCOHOLIC BEVERAGES

Water, pure and simple, barring exceptional cases, has never constituted the only and exclusive beverage among the nations inhabiting this mundane sphere. In all ages throughout the world liquid refreshments containing alcohol have enjoyed a special privilege and have been held in high repute. The methods of preparing them, the taste, the strength are ever changing with the habits, the customs, and opinions of individual peoples; but they all present, in the principle, the same beneficial and deleterious characteristic qualities.

Here we are at once face to face with one of the burning questions of the age—the social problem of the period, viz., alcoholism. It is quite impossible to deal, in a short chapter, with this important subject, on behalf of which oceans of ink have already flowed from a thousand pens of able writers—a question which enlists the interest of the pathologist, hygienist, sociologist, and moralist, as well as that of the political economist. The lines which we intend to follow are of a threefold nature. 1. We shall rehearse the

principles which seem to be more or less established, at the present moment, as to profit and loss in the use of alcohol. 2. We shall consider the percentage of alcohol contained in various beverages. 3. We shall enumerate and give the advantages and disadvantages of such substances as may act as equivalents of, or substitutes for, alcohol.

ALCOHOL

1. Is alcohol a food; or, in other words, is our organism capable of burning up alcohol introduced into our system to advantage, and of utilizing its heat for the purpose of meeting our calorific needs? This question has been fully discussed from every possible point of view, and has been the subject of innumerable experiments, seemingly in favor of the affirmative. The claims advanced by Atwater appear to be most conclusive. He put a man into a calorimetric chamber for a period of three days, ascertaining all the time the number of calories obtained by a given non-alcoholic regimen. During the next three days he substituted an isodynamic quantity of alcohol for an equivalent amount of carbohydrates, resuming the original

non-alcoholic regimen for the subsequent three days. The resultant in calories, in both instances, was the same within one thousandth part of 1 per cent. The conclusion, therefore, is that alcohol is utilized by the organism, and, as a nutrient can replace an equivalent amount of sugar or starch. But this holds good only when alcohol is absorbed in small quantities. If consumed in large quantities it is, in part, eliminated through the lungs, through the kidneys, and by perspiration, without being utilized by the economy. Thus we are aided in making an exact calculation as to the quantity and proportion of the alimentary value contained in alcohol.

The isodynamic equivalent of alcohol is 7 per cent; that is to say, one gram of alcohol will give 7 calories; or, to be quite accurate, 7.184. It is evident that this percentage exceeds that of carbohydrates and of albumin, and almost equals that of the fats.

2. *Reactions.*—The action of alcohol on the stomach is well defined, and subject to two factors, i.e., quantity and concentration. In small doses, and when of low proof (50 per cent), alcohol facilitates the task of the stomach, espe-

cially its secretory functions—a fact which is well known and often brought into practical use with advantage. Strong and oft-repeated doses of high-proof spirits irritate the gastric mucous membranes, give rise to functional troubles and to anatomical lesions on parallel lines, to hyperchlorhydria, to mucous hypersecretion, to apepsia with corresponding glandular proliferation, accumulation of mucous elements and mucous atrophy. Often these lesions do not last a long time, but break out as ulcers, nearly always followed by hematomesis.

There is scarcely any direct action on the intestines, as alcohol is nearly fully absorbed by the stomach; but the secondary reflex action disturbs the gastric functions throughout the whole length of the tube. The first point of attack is the liver. Small doses congest the parenchyma, and excite the cellular stricture; strong and frequent doses provoke a reaction in the connective tissues. Clinical experience has shown that alcohol, in its very diluted form—for instance, wine—constitutes one of the principal factors in *cirrhosis;* but, in massive doses, it clogs the hepatic cellular structure, and may bring on grave attacks of jaundice.

The circulatory system is likewise affected, for it accelerates the heart's action, hastens the circulation, causes congestion of the face by vasodilatation, and produces an appreciable sensation of heat. Prolonged abuse frequently leads to cardiovascular sclerosis.

Its tonic and exciting action extends, in equal measure, to the nerve-centers; hence it may be considered a nerve food, like coffee and tea. It is universally acknowledged that alcohol produces a feeling of euphoria, diminishes fatigue, and augments, for the moment at least, muscular power and cerebral activity. Poets without number, and writers in every branch of literature, often enough seek inspiration in the cup that cheers.

Alcohol certainly influences the general process of digestion, and here again the question of quantity is of the utmost importance. It undoubtedly accounts for the many contradictory results obtained in experimental research. A small dose of alcohol, i.e., less than one gram per kilogram, diminishes the percentage of nitrogen in the urine, and restrains, in clearly defined proportion, the disassimilation of fats and albumin. In this regard it is inferior to fat, and

still more so to carbohydrates; on the contrary, in strong doses it augments this disassimilation of nitrogen and the excretion of urea. If, in the former case, its action is simply that of a tonic, in the latter it comports itself as a violent stimulant.

Normally, alcohol acts through the kidneys. It is burned up there and eliminated in the form of water and carbonic acid. By its sclerosing action on the vessels it may seriously handicap the renal functions.

Alcohol is endowed with a twofold character: it is a food as well as a nervine. As a food it possesses a nutritive value which is far from being negligible; as a nervine it sways, by way of the nervous system, a notable stimulating power over all the functions of the body. But, as is the case with all substances belonging to this category, it cannot be ingested in quantities even in the slightest degree excessive, without detriment to the organism. It is really a dangerous food, as it is strongly intoxicating, and its use has to be forever most carefully watched and controlled. Just so soon as the normal dose is exceeded, alcohol no longer nourishes; it intoxicates. It gives off its heat rapidly, so to

speak in a brutal manner, and the best part of it is lost without profit to the system. Instead of deriving a benign stimulation from its ingestion, the organs find themselves quickly in the turmoil of excessive excitation, which is fatally followed by a pronounced depression demanding fresh libations of the stimulating fluid and in ever-increasing quantities. This succession of alternatives is very baneful, and lays the foundation for gastritis, cirrhosis of the liver, cardiovascular sclerosis; the faculty for physical work is diminished (Chauveau), cerebral productivity becomes more and more impaired, nutrition is inhibited, followed by pathological conditions such as arthritis, and even tuberculosis.

These general remarks will assist us greatly in forming a correct judgment of the respective value of the various alcoholic beverages under consideration. The first rule to be observed is, to avoid altogether all that have a strong concentration; that is, a high percentage of alcohol. The second is, beverages in which alcohol is strongly diluted, are permissible.

Nevertheless, the problem is not without vexatious complications on account of the presence of secondary substances—alcohols of superior

grades, essences, and different compounds, which add their useful or noxious effects to the basic action of alcohol.

ABSINTH—APERIENTS—LIQUEURS

All these products, although of widely differing composition, deserve to be gathered under the common title of reprobation. The partisans in the antialcoholic war are all in accord in demanding their absolute and unconditional suppression.

Their intoxicating power is chiefly due to the high percentage of alcohol, as will be apparent from the following table:

From 20 to 30 per cent.....	Vermouth Bitters (Picon)
From 30 to 40 per cent.....	Sweetened liqueurs Kümmel Black currant catafia, etc.
From 40 to 50 per cent.....	Anisette Chartreuse Apple-Jack Cognac Kirsch
From 50 to 60 per cent.....	Bitters Curaçao Rum
From 60 to 80 per cent.....	Absinth

Their deleterious qualities are further increased by the addition of superior alcohols—

much more intoxicating than ethyl alcohol—and certain essences particularly noxious to the nervous system.

Absinth easily tops the scale of toxicity. It is a violent poison for the nervous cells. Absinthism has in its wake, neurosis, epilepsy, insanity; and, for the offspring, nervous defects without end and number.

The aperients follow in second line. They contain so-called aperient substances macerated with the alcohol. In reality, they are most harmful to the functions of the stomach; in fact, as a rule, they ruin the stomach first, before they strike the liver and the arterial system.

Liqueurs enjoy a slightly better reputation. Nevertheless, they contain a very large percentage of ethyl alcohol, with the admixture of other high grade alcohols such as propylic, butylic, amylic, etc., and of ether in varying quantities, by no means negligible. And yet we speak here only of the highest grades of spirituous preparations. If the unfortunate workingman only knew the nature of these admixtures that are put into what is given him to drink, he might be more cautious and reserved in his potations.

It is the abusive use of liquor and wine that builds up the long list of cases of chronic alcoholism, with its formidable retinue of gastric, hepatic, and vascular complications. The worst feature of this sad state of affairs is the fact that it is by no means due to excessive periodical drinking. It is the regular daily consumption of even moderate doses that plays the havoc. The man who drinks, say one glass (20 grams) of cognac or whisky, or any other drink after each meal, consumes 20 c.c. of alcohol every twenty-four hours, or an equivalent of at least one-third of the maximum dose permissible. Add to this the usual quota of malt liquors and wine taken during the meal, and it will be at once apparent that the grand total of alcoholic liquid consumed borders on or exceeds the limit of what may be considered innocuous.

The steady, daily consumption of alcohol by persons otherwise in good health, claims, therefore, serious attention, and should be combated as profitless and outright injurious.

It is different when we have to deal with pathological conditions, however, in which alcohol may render truly beneficial services. Thermic and neurovascular stimulation and cardiac

tonicity engendered by its application prove extremely useful in the treatment of *grave infections* with *nervous asthenia, slow pulsation, syncope, hypothermia,* and *general collapse;* likewise in *typhoid pneumonia, infectious grippe, typhoid adynamic fevers,* and, generally speaking, in all *infectious* diseases which are accompanied by *cardiovascular asthenia.* Even heroic doses of, say, 100 grams of rum or cognac per day, are not fraught with danger. Alcohol acts in these cases like a medicament, a food, since 100 grams mixed with sugar will give as much as 470 calories, and will limit, like an aliment of economy, disassimilation.

Its value in this respect is of the same import in the fever patient and the healthy person alike.—(*Ott.*)

Alcohol has, in recent years, been strongly recommended to *diabetics,* because it furthers the tolerance of fats by the stomach, acts not only as a nutriment, but also exerts a happy influence over the utilization of sugar, and minimizes the chances of interference by acetonuria. But, particular care must be taken not to exceed the proper measure, or to neglect the special contraindications given for individual cases.

WINES

Alcohol by Weight.	Carbohydrates.	Ash.	Purin.	Chlorid.	Calories.[1]
5.7 to 8.6	1.7 to 2.8	0.11 to 0.26	0	0	47 to 74

It is evident that wine is entirely free from fatty and nitrogenous substances, and from purin bodies.

Ethyl alcohol is the principal compound, the percentage of which varies with the different growths. We affix here a table, giving the names of the best known brands of wine and their respective percentage of alcoholic content.

From 9 to 10 Per Cent.

Bourgogne, red ordinary.
  " white ordinary.
Bordeaux, ordinary.
  " red—special growth.
  " white—special growth.
Gers.
Alsatian, white.

[1] These figures do not refer to the heavy "liqueur" wines such as Madeira and Port, etc., nor to Champagne.

From 11 to 12 Per Cent.

Bourgogne, special growth.
Medoc.
Narbonne.
Algerian wines.
Rhine wines.
Tokay.

From 13 to 15 Per Cent.

D'Asti.
Spanish wines.
Champagne.

From 15 to 17 Per Cent.

Port.
Madeira.
Marsala.

It is important to be familiar with these figures, for often it may be opportune to remind a patient inclined to a liberal use of wine that a bottle of Bordeaux represents about 66 c.c. of absolute alcohol, or a glass of Champagne 17 c.c., or a glass of Madeira 7 c.c. A calculation on the total amount of alcohol absorbed during twenty-four hours will sometimes not a little surprise the patient.

The ethyl alcohol is accompanied by superior alcohols, such as propylic, butilic, and

amylic, which are intoxicating in a much higher degree; but, luckily, present only in small quantities, though the proportion is higher in those growths the aromatic flavor (bouquet) of which is more prominent.

Among the carbohydrates special mention must be made of glycerin—it varies from 4 to 13 grams per liter—mannite, levulose, and glucose. The two last-named substances are especially abundant in certain liqueur wines such as Malaga, which may contain as much as 150 grams per liter.

Wine contains organic acids, principally tartaric acid, found almost entirely in the potassium, and is particularly abundant in the Medocs and the wines from the Bourgogne; also œnotannic acid, up to 2 grams in the red wines—the white wines show only traces in the summer-time; of mineral acids, sulphuric and phosphoric acids are present. Among the basic substances potassium, lime, magnesium, and iron may be mentioned; they vary from 0.008 gram to 0.05 gram per liter.

The percentage of acidity is weakest in the Alsatian and Bordeaux wines; it increases in the order named here in the Rhine wines and Alge-

rian, in Madeira, Marsala, and Champagne, and in the red; and still more so in the white wines from the Bourgogne, reaching the highest volume in the Muscat d'Asti. As a portion of this acidity is organic, and consumed by combustion, wine is, so far as nutrition is concerned, in reality but slightly acid.

There is no need for discussing here the reaction of wine on our organism, as it coincides with what we have already said about alcohol in a strongly diluted state. We will, however, make mention of the evil effects of tartaric acid which is apt to fatigue the stomach, and those of tannin which make the red wines rather binding. The white wines are diuretic. Very young wines often enough irritate the intestinal canal and produce diarrhea.

Adulterations.—Not so very long ago this enterprise had assumed formidable dimensions and contributed not a little to that vigorous campaign against the use of wine in general, which was then being waged, but overproduction of the genuine article has largely contributed to relegate it to the past. The most inoffensive methods are watering, sugaring, and the blending of different vintages. The addition of

coloring matter, especially of fuchsin, often containing arsenic, is harmful. While the admixture of sulphate of potassium for the purpose of precipitating the albuminoids and microbic substances, called "platrage" by the French, is absolutely injurious to the stomach. [The so-called artificial wines manufactured from substances foreign to grape-juice deserve no special mention here, as they contain none of the qualities attributable to the genuine article.—*Translator.*]

Indications and Contraindications.—We do not hesitate to range wine among what is rightly called "hygienic beverages." We have already pointed out the tonic and nutritive effects of alcohol when consumed in small doses; and with wine it is comparatively easy to restrict the use to minor quantities. A bottle of wine of 600 c.c. contains about 60 c.c. of absolute alcohol, or less than the maximum allowance for an adult of middle weight. If this quotum is not exceeded in twenty-four hours, the wine will act as a rational stimulus to the different organs of the body and further their functioning powers in a useful manner. This benign influence is strongly felt by those who lead a strenuous life,

or who are exposed to frequent changes in the weather, and to the inclemencies of an intolerant climate. Still, if there is an inclination to excessive consumption, it is better to enforce total abstinence, not only from grape wine, but also from all other beverages containing the noxious and dangerous elements of alcohol. Fortunately, it seems an established fact that wine-growing countries are comparatively free from the ravages of alcoholism.

Apart from the stimulating, nutritive, and tonic qualities which wine possesses, other very valuable antiseptic properties belong to it, of especial merit to the inhabitants of countries where the drinking-water is often bad and vitiated. Sabrazis has found that Eberth's bacillus lives only two hours, i.e., in the human body, after partaking of red wine of 10 per cent; thirty minutes after ingesting Bourgogne, twenty minutes after old white wine, and ten minutes after Champagne.

The acidity seems to have a stronger reaction than the alcoholic content. Moreover, by acidulating the drinking-water with wine, about twelve hours before using it, a suspected water may be purified and sterilized. It is an old cus-

tom, practised so much in the monasteries and colleges of former days, and undeservedly decried by modern authorities.

Wine should not be given to children under twelve to fourteen years of age; but, during the period of pubescence, it will often prove a useful aid in overcoming the trials and troubles as well as the dangerous complications of this passage. From fifty to fifty-five years and upward the daily ration must be restricted, as should be the case with all stimulating aliments. Woman, also, has every reason to be more abstemious than man.

In a number of pathological conditions wine accomplishes much good, but wisdom in the proper choice is required, especially in the elimination of fraudulent and adulterated preparations. A good old Bordeaux generally agrees with *convalescents.* In *anemia* and *chlorosis* a Bordeaux, at least two years old, will prove of benefit, as it is rich in iron and tannin; likewise in tuberculosis, unless it is contraindicated by *dyspepsia, diarrhea,* a tendency to *hemoptysis,* and *congestion.* *Diabetics* may make fair usage of dry wines, but must avoid the sweet brands. We have already pointed out the happy influ-

ence exercised by alcohol upon *glycosuria* and the digestion of fats, so important in diabetes. Gautier emphasizes also with good reason the antiscorbutic properties of the red wines.

Another factor in their favor is, also, that they keep better than the white wines. The contra-indications are numerous and important. First of all we mention *cirrhosis*, especially in the *ascitic* form with *portal hypertension*, which is, in effect, one of the more frequent complications of vinism. The patient afflicted with this malady betrays a most astounding susceptibility in this respect. The ingestion of even the most minute quantity of wine often suffices to reawaken symptoms which lay dormant for months.

On the whole, wine is injurious in all *liver* complaints, especially in the congestive forms of *arthritis* and *malaria*. In all hot climates, abstemiousness in the use of alcoholic drinks is an essential condition for physical welfare.

Dyspeptics rarely tolerate wine in any shape or form. Sweet wines, red wines, especially the heavier sorts, and the indiscriminate use of several kinds of wine during the same meal frequently account for the trouble. In the lighter forms of *hyper-* or *hypo-chlorhydria* a small dose

of white Bordeaux, mixed with water, may be allowed. An exception may be made with Champagne, which possesses a special virtue on account of its large content of carbonic acid. It is indicated in all cases of *gastric intolerance,* in *acute* diseases, affections produced by *chloroform,* and in *pregnancy.* It has a tonic effect on the organism worthy of our attention. Thoroughly iced, it is more active than when served at the ordinary room temperature.

In *intestinal* affections the use of wine is limited. In *constipation* and *enterocolitis* the red wines, especially those of high flavor, should be avoided.

In *nervous* diseases, *neurasthenia,* and *hypochondria,* and *mental* affections, it is always injurious. It is astonishing how total abstinence will often cause the symptoms to vanish rapidly, only to recur again as suddenly after the slightest indiscretion. All these patients are supersensitive to every excess in the diet, especially in the use of alcoholic stimulants.

Wine is absolutely to be excluded from the menu in all *cardiovascular* affections, especially in *hypertension,* in *aortitis,* and in *angina pectoris.* In *albuminuria* white wine is, perhaps,

less injurious than the red. Old red Bordeaux agrees with *orthostatic* conditions. It is also preferable in *renal lithiasis,* as it is less alcoholized and less acid. Moselle and Bourgogne wines should be treated with distrust.

Strict sobriety is also to be prescribed for all workers exposed to *saturnism,* for alcohol is prone to favor the frequency and gravity of accidents.

In *gout,* von Noorden grants a small allowance of white wine, thinned out with water. Champagne is preeminently forbidden.

In *chronic rheumatism, neuralgia,* rebellious *migraine* and *asthma,* abstention from wine should always be counseled. The symptoms will very often quickly disappear. *Skin* diseases, *eczema, psoriasis, furunculosis, acne rosacea,* all demand total abstinence. The evil effects of wine on the *complexion* are so well known that women of fashion, solicitous about their beauty, are wont to confine themselves to the exclusive use of water as a beverage.

BEER

THE manufacture of beer is more complicated than that of wine. Barley, which forms the ordinary basis, is turned into malt by allowing it slowly to germinate in vaults at 50° F. Diastase is thus developed, which transforms the starch into dextrin and maltose. The whole is then dried in a temperature of 165° F., when more maltose and less dextrin is produced. Under these conditions the light, amber-colored beer is obtained. At 225° F. the dark beer is the result, which contains less maltose but more dextrin, which is not subject to fermentation.

In the process of brewing the grain is filtered off with water at a temperature of 160° F., which process carries with it the diastase, invertin, dextrin, maltose, and albuminoid matters. These in their turn become partially peptonized, while a large proportion of the maltose is changed into glucose. When desiccated, this maltose furnishes what is known as "Malt Extract."

Hops, in certain quantities, are added to clarify and preserve it while giving the beer that bitter taste.

Fermentation is produced by the addition of fresh yeast, which transforms a part of the glucose into alcohol and carbonic acid. High fermentation at a temperature of 50° F. ensues quickly, and produces a light beer or small beer; low fermentation at 40° F. or 42° F. is much slower, and produces a heavier beer, called "lager."

The mean composition of beer is:

Albumin.	Alcohol by Weight.	Carbo-hydrates.	Ash.	Chlorid.	Purins.	Calories.
0.50	3.90	5.9	0.19	0	0.01[1]	50

Beer differs from wine by the presence of purins, an appreciable amount of sugar, and a small percentage of alcohol, which latter circumstance makes it a trifle less nourishing, the alimentary value being only 55 to 60 per cent.

Besides these constituents beer contains a notable proportion of carbonic acid, which makes it sparkling; also some bitter, resinous, tonic substance, certain acids and salts, but chiefly earthy, alkaline phosphates.

[1] Porter contains 0.17 purins.

The dark brown beers are more nutritious, richer in extracts and dextrin, but poorer in alcohol.

Malt Extract possesses highly nutritive qualities. Liebe's preparation has the following composition:

Albumin.	Maltose.	Dextrin.	Calories.
5	76	16	390

The diastasic ferments which it contains, advance digestion and assimilation, and are splendid agents for superalimentation.

The heavy English beers—pale ale and porter —exceed in the percentage of alcohol and purins.

As beer contains more water and less alcohol than wine, its action on our organs is slightly more beneficial. The gastric reaction is compensated for by the presence of carbonic acid and the hops, also by the deficit in alcohol, which renders it very easy on the stomach. Considerable quantities may be absorbed without engendering any appreciable degree of gastric fatigue. When consumed with the food, it has wrongly been accused of impeding digestion. This is not true, except in very rare cases. But it is well to know that beer and milk are incompatibles. The dark brown beer

is always better tolerated than the light-colored beer. Beer is slightly intoxicating, and may be justly called a non-calorific beverage. Yet, it is benignly tonic, diuretic, and even diaphoretic. If drunk to excess it fatigues the heart and the arteries, the liver and the kidneys, by producing a surcharge of aqueous infiltration of the organism which may deteriorate into atheroma, sluggishness of metabolism, and obesity.

Indications and Contraindications.—Beer deserves the title of hygienic beverage even more so than wine. It nourishes more and alcoholizes less. Two liters of light-colored beer contain less alcohol than 600 c.c. of wine, and yet have double the nourishing power, or more. Again, it is much cheaper in price, and therefore is within the reach of the poorer classes. It is to be feared, however, that men who perform very fatiguing tasks, not finding in beer the desired stimulus, will fall back on stronger concoctions.

In *pathological* conditions preference is given to dark malted beers. They certainly furnish an excellent drink to dyspeptics, particularly in cases of *gastritis* of long standing, in *atony*, *tuberculosis*, *emaciation*, and *cachexia*, when wine

cannot be tolerated, and in *nervous* affections. Beer may be of service in certain cases of *hepatic* insufficiency and *intestinal* susceptibility. It is of unquestionable value to the *pregnant* and *nursing* woman, as it stimulates lacteal secretion, apart from being a food.

It does not suit *diabetics.* Leo claims that the products of yeast fermentation are injurious to the patients. Neither does it agree with *gout, congestion* of the *liver, obesity, Bright's* disease, *albuminuria, atheroma,* and *cardiac* troubles.

The light-colored beers must be avoided by *dyspeptics,* and in all cases of *enteritis, dysentery,* catarrh of the *bladder,* and in *blennorrhagia.*

CIDER

COMPOSITION AND REACTION

Alcohol by Weight.	Carbohydrates.	Ash.	Calories.
2.08	3.40	0.20	34

Cider is generally made from a certain kind of apples called "cider apples," which are crushed, together with a given amount of water, through a press. The juice, which is drained off, is again diluted by the addition of one-third of its quantity of water, and is then allowed to ferment. The acids, in proportion slightly less than in wine, are altogether of an organic nature, and by combustion alkalize the cider.

In this respect, and also because its alcoholic content is low,[1] cider makes a good, pleasant, and refreshing drink; but it contains very little toxicity, and is still less calorific than beer. This accounts for the sad fact that cider-pro-

[1] This defect in alcohol is still further increased by the fact that the peasants, as a rule, add yet more water to the cider set apart for their own use, serving it under the name of "cider water."

ducing districts pay such a high tribute to alcoholism.

Indications and Contraindications.—Cider retards gastric digestion, and is not fit for dyspeptics. Its purging propensities make it risky for those who are inclined to *diarrhea,* but useful in *constipation.* Garros attributes to cider antigouty and antiuric properties, which accelerate the elimination of uric acid by alkalizing the humor, for which reason he recommends it in cases of *urinary lithiasis* and in *gout.*

To make sweet cider the apple-juice is drawn in bottles before it has had time to ferment, and left there until it is clarified. This makes a sparkling liquid, full of alcohol, which easily goes to the head. It should be consumed in small quantities only.

VEGETARIANISM

It would be partial to wind up a book of this kind without devoting at least a few words to the important problem of vegetarianism. Since Pythagoras was one of the first adepts in its practice, it has always been able to boast of a goodly retinue of partisans. Nowadays the number of adherents and enthusiasts is on a steady increase, especially in England and Belgium, countries in which of yore the abusive use of meat has been most rampant. The movement is strong, and many attempts have been made to put it on a scientific basis by advancing its rational and physical advantages. In fact, we have already a formidable array of books, pamphlets, and treatises on the subject, which are by no means devoid of interest; but, on the contrary, worthy of our attention and closer study.

It is scarcely necessary to give here a definition of the meaning of the word which implies its purpose, viz., the restriction of our daily

diet to foodstuffs gathered from the vegetable kingdom, to the rigid exclusion of animal foods. Such, at least, is vegetarianism in the strict sense of the word; although there is a milder form in which the use of meat only is eliminated, while milk and eggs still find admittance into the sacred precincts of the dining-room. The term "fruitarianism" is self-explanatory.

Vegetarianism is, primarily, a reaction emanating from the abusive use of meat in contradistinction to the wide-spread belief that a good piece of savory, underdone (rare) beef constitutes the best possible nutriment. So far as that is concerned, we are free to admit that an excessive meat diet entails greater disadvantages than real alimentary benefits.

The tenets of vegetarianism may be thus briefly summed up:

1st. *It is a regimen poor in nitrogenous substances, but rich in ternary bodies, and of undoubted advantage.* It is beneficial to the digestive organs, which, instead of being subjected to the abrupt and violent stimulation of carnal albumins, are exposed only to milk and the sustaining action of vegetable substances. The middle intestinal regions are also agreeably

affected by it, as they are kept free from nitrogenous elements, which form so excellent a culture medium for the intestinal flora. The kidneys, too, are relieved, for a smaller amount of residue is left behind to be eliminated. Therefore, the benefit accruing extends throughout the whole process of digestion.

The physical exertions required for the proper digestion of meat foods are minimized in the vegetable diet. The ternary bodies are, after all, agents of economy in the same manner in which nitrogen accumulates conditions of disassimilation. Desgrez claims that the destruction of albumin reaches its apex in the meat diet, touches its lowest level in the vegetable diet, and holds the golden mean in the milk diet.

As a producer of energy, nitrogen is the equal of the ternary bodies. But nitrogen acts in a blunt, abrupt fashion, and may even cause a waste of energy; while the fats and carbohydrates free their energy in a slow, progressive manner, and in proportion to our bodily needs.

It seems also to be established that vegetarianism, when tolerated, confers an increased superior power of endurance when moral and

physical efforts are required. In sporting exercises, and, generally speaking, in endurance tests, vegetarians have certainly proved themselves superior to meat-eaters. Fauvel claims, from personal experience, to have become much more inured against fatigue since he became converted to vegetarianism. Lefevre insists upon increased resisting power against cold, observed in himself and in a number of other vegetarians. Moral advantages are by no means less conspicuous; intellectual occupation becomes easier, and brain work more intense; the mind is more cheerful, and the temper more evenly balanced. Such are the virtues claimed by the vegetarian school.

2d. *It is a regimen poor in purins and, therefore, less toxic.* The purins contribute in a large measure to the toxicity of meat. Their numberless misdeeds have been thoroughly studied by the vegetarians, especially by Haig, whose work we deem it profitable here to review in brevity.

In meat-eaters he finds an overproduction of uric acid, and also a retention by reason of humoral acidity, which inhibits elimination. This excess of uric acid retards the circulation by its

vaso-astringent action, and may also increase the viscosity of the blood; it engenders, likewise, the sluggishness and the physical and moral torpidity so often observed in heavy meat-eaters. A fresh repast of nitrogenous food may well, by raising the amount of acidity and precipitating the uric acid into the tissues, produce a momentary sensation of comfort; but this does not endure and soon makes room for a corresponding feeling of depression. The need for nitrogenous ingestion increases in a similar manner as the craving for alcoholic stimulants becomes ever more exacting in those addicted to drink.

Such is the beginning and the course of this phase of diet. The accumulation of uric acid is incessantly heaped up; and, ere long, morbid symptoms manifest themselves. These characterize the second phase, marking a still higher degree of intoxication, the modality of which depends on individual reaction. Migraine may serve here as a typical example for demonstrating how Haig explains the affiliation of untoward events. According to him, migraine is due to a sharp crisis of alkalinity of the blood arising from toxic substances; uric acid now enters the circulation in large quantities, "the

small blood-vessels are contracted, the skin is chilled, vascular tension increased, secretion of urine diminished, the nerve-cells are shocked, moral force is weakened, and intellectual power becomes clouded."—(*Ioteiko.*)

By analogous deductions he attributes a whole mass of diseases to this accumulation of uric acid in the system, viz.: epilepsy, asthma, hysteria, dyspepsia, hemoglobinuria, anemia, albuminuria, diabetes, cardiac defects, etc.

Gout and lithiasis are the last phases of this condition, the last degree of accumulation of uric acid, the surest symptom in an unmistakable diagnosis of uricemia. This is Haig's theory. In certain regards it is, perhaps, somewhat exaggerated; but, by therapeutic experiments, he proceeds to prove its truth. These he based upon a diet capable of reducing the production of uric acid. Now, as there is a number of vegetable aliments which contain xanthic bodies, such as legumes, asparagus, mushrooms, beer, tea, cocoa, coffee, Haig advocates a special vegetable regimen which might be called antiuric, in which all these substances are prohibited, but the use of milk and eggs is permissible.

3d. *It is a regimen more mineralizing than*

any other. The proportion of ash is undoubtedly higher in vegetables, and green vegetables, especially, are ten times as much mineralized as meat.

4th. *It is a regimen very rich in cellulose, and, by reason of a superabundance of residue, better adapted to prevent constipation and intestinal stasis.*

5th. *It is more hygienic,* because certain vegetables (dried legumes) and fruits are easier to keep, and not so readily subject to change. Moreover, disease is rarely transmitted from the vegetable kingdom.

6th. *It is the least expensive diet.* This side of the social question is of great importance, and has been dealt with in a very able manner by Professor Landouzy, by Marcel, and Henri Labbé. Meat is expensive, and contains but little nourishment. Legumes and cereals are comparatively cheap, and full of nutriment.

* * *

These are the principal claims advanced by the disciples of vegetarianism. It remains now for us to expose the possible fallacies contained in this doctrine, and to point out the objectionable features. This we shall do by showing un-

der what conditions a vegetable diet may prove profitable, or, on the contrary injurious, to the health of man.

The first objection is that it jades the digestive organs and causes discomfort and tension. It lacks nearly all the stimulating qualities contained in meat. To give an equivalent value of calories, a much larger volume of food is required, which produces a feeling of fulness and overloads the digestive apparatus, while absorption is imperfect.

The vegetable albumins are tougher, and resist the attack of the gastric juices much longer. Pauloff has demonstrated that, for instance, the nitrogen contained in milk imposes a much heavier task on the stomach, as well as on the intestines, than the animal nitrogen; and bread does still more so.

These observations possess a great deal of force, and command our careful consideration. It is a matter of common knowledge that persons who follow a rigid vegetable diet suffer greatly from dyspepsia, distention of the stomach, abdominal pressure, and intestinal flatulency. The partisans of this reform do not take the trouble of denying the existence of these

evils, but they make strenuous efforts to prevent the mischief. In the first place, they seek to diminish the percentage of albumin; then their advice is to protract the meals and eat the vegetables in slow and easy stages; to masticate with better care, thus reducing the surcharge of liquid content and the volume of the food; and, finally, to make successive attempts with interruptions, when passing from the meat diet to the vegetable regimen, thus giving the stomach and the canal proper time for adapting themselves to the new habit. Judicious though these precautions may be, we do not believe that they are adequate to make everybody—the fragile and strong—accustomed to a strictly vegetable diet. On the contrary, we are of the opinion that many persons with a weak and delicate stomach, with "civilized" intestines, or a "businessman's" digestion, will readily agree with our objections.

A purely vegetable regimen fails to supply the organism with the necessary vascular and nervous tonicity. A decrease in alimentary stimulation must needs impair the vital functions of the digestive glands. If this is true in certain morbid conditions, it applies to the

healthy being, just as well. The resisting power against disease is also weakened. According to Ewald, the percentage of sickness and mortality among the prisoners who are kept on a rigid vegetable regimen is much higher. Excessive deprivation of tone and excitation is prejudicial to our modern surroundings, and does not agree with the exigencies of a strenuous life. We all have to undergo hardships and perform fatiguing tasks for which a certain amount of stimulation is required, which, however, cannot be found in a vegetable diet.

Moreover, as vegetables have to be ingested in large quantities, they carry with them into the system also an undue amount of lime, which surcharge may become the hatching ground for *chronic rheumatism* and *atheroma.*

So far as *rheumatism* is concerned this danger is, perhaps, only imaginary, despite the fact that it is strongly in evidence among herbivorous individuals, because it is rather due to the action of hyperacidity, which impedes the excretion of phosphate of lime; and that defect seems to be rather corrected by a vegetable regimen. As regards *atheroma,* however, the objection assumes a serious aspect.—(*Loeper* and *Boveri.*)

Of course, a wise choice among the vegetable foods is always possible when this dangerous condition is threatened; for instance, legumes, cabbage, spinach, carrots, rye, and oats might be eliminated from the diet, while the other cereals, also potatoes, rice, pastry, a number of green vegetables, fresh fruits, and nuts—all poor in lime, yet rich enough in food value—still remain available.

Nevertheless, the last two objections are by no means definite or conclusive. But those mentioned at first should always be taken into serious consideration when an opinion must be given on the opportuneness of a vegetable regimen.

That vegetarianism possesses great virtues in certain *pathological* conditions is now generally admitted even by those who do not approve of it for the normal human being, particularly in cases of *arthritis*, unless it disagrees with the patient, which is often enough the case in *hereditary* arthritis, especially in the second and third generation, when the digestive tube is too delicate and weakened to get used to it. But the heavy eater, the "bon vivant," who has poisoned his constitution by excesses, is well ad-

vised if he adopts a vegetable diet, which, unless it is already too late, will improve his health and prolong his life.

Other morbid conditions akin to arthritis will also be benefited by it, always on the condition that the organism is strong enough to support it. To this class belong those who suffer from *fatty degeneration* of the *liver*, *neurasthenic hypertension*, *migraine*, *rheumatic* affections, *neuralgia*, and *rebellious sciatica*. *Urinary lithiasis* is also an indication; but the biliary form is an exception.—(*Martinet.*)

As for *gout*, opinions differ. Maurel and De Grandmaison recommend a vegetable diet. Garrod, Ebstein, Cantani, von Noorden, allow meat in small quantities. Von Noorden's contention is that meat assists in eliminating uric acid by reason of the thymic acid which it always contains.

In many *skin* diseases a vegetable diet is also a great boon. *Eczema*, *acne rosacea*, and *psoriasis* often yield to it when external remedies have failed.

In *Bright's* disease and *albuminuria* of certain standing, a vegetable diet, with milk, eggs, and cheese, often gives satisfactory results.

The same may be said of *hyposystole*, *myocarditis*, and all ailments attended by *insufficiency* of the orifice. All these require foods of easy digestion; and a strict vegetarianism imposes upon the heart and intestines an extra amount of activity, both useless and dangerous. In *scleroma*, *hypertension*, *aortitis*, and *angina*, a vegetable regimen may be recommended with advantage; but milk must be allowed under all circumstances, as it agrees with the patient better than any other food.

In *digestive affections* it is rarely indicated. Exceptions are: *chronic constipation*, *hemorrhoids*, and *hyperchlorhydria*, in which it may assist in inhibiting gastric secretion. But the opinions are divided on this subject. A. Robin is strongly in favor of meat in hyperchlorhydria. We add also *enterocolitis*, but only in its graver forms. The famous regimen of Combe is said to be of a vegetarian character.

"Vegetarianism presupposes an absolute integrity of functional energy. It does not suit constitutions weakened by hereditary taint, by disease or old age; neither does it agree with weak stomachs."

This phrase of Professor A. Gautier comprises

all the *contraindications* of vegetarianism. It points out in unequivocal terms all the conditions in which it is not only unserviceable, but really dangerous, viz.: *tuberculosis*, which requires the largest possible food value in the smallest possible volume; *dyspepsia* by *insufficiency*, *intestinal atony*, and *ptosis*, all of which require a stimulating diet combined with the least possible encumbrance—women worn out by pregnancy and nursing, all those who have to build up lost tissue and require feeding up, or who lack digestive or general tonicity.

If we pass from the *pathological domain* into that of physiology, the question at once arises: Is vegetarianism, under all circumstances, applicable and beneficial to every human being in perfect health? We do not believe it. Man has ever been omnivorous. The oldest customs—the very structure of his digestive apparatus—prove that the mixed diet is the most suitable. This is preeminently true in respect to the growing youth. In the period of formation and development, animal food is a matter of necessity. For the full-grown adult we must make a distinction. Sigaud divides the human race into two classes—the strong and the weak. The

latter cannot afford to eschew the tonic stimulation of meat. The former thrive sometimes on a vegetable diet.

In summing up we will admit that vegetarianism is an excellent regimen for many, but it does not suit all. A modified vegetable diet, that which includes eggs and milk, appeals to us as more rational and suitable for many individual cases.

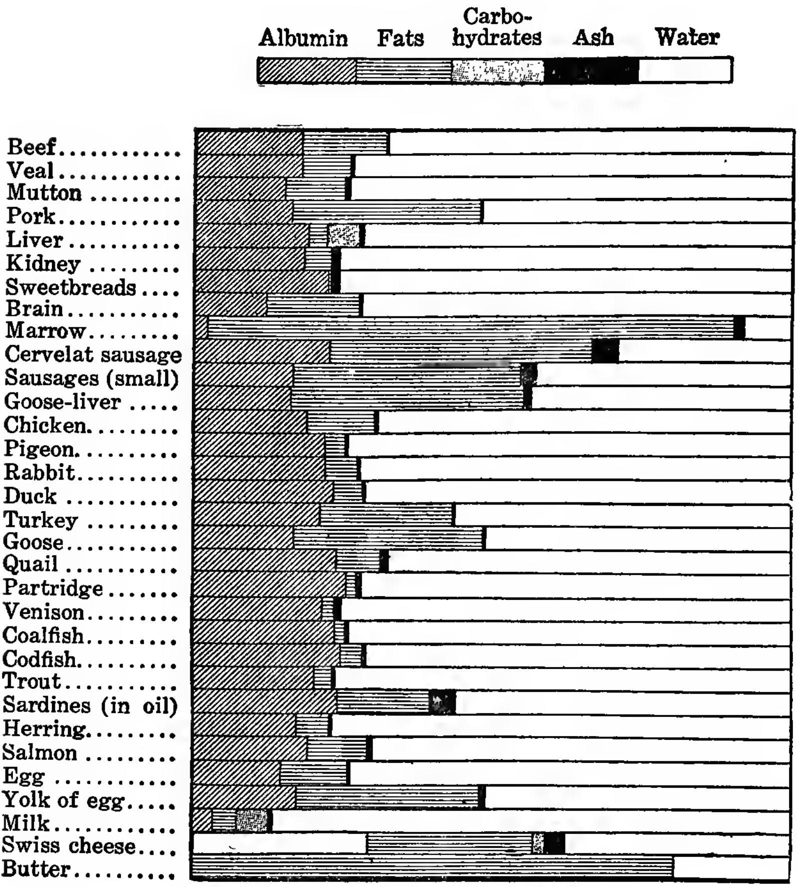
In conclusion, we do not hesitate to borrow another notable phrase culled from Professor A. Gautier's book:

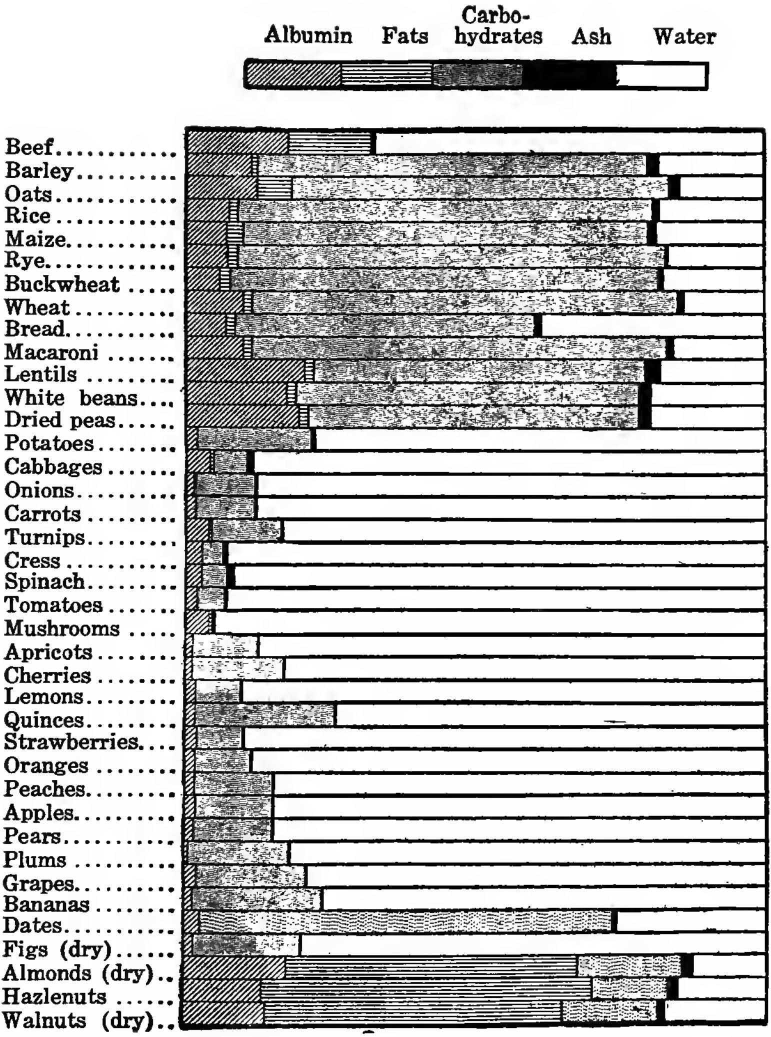
"A system of modified vegetarianism should gradually eliminate the fierce and rugged elements from man's character, and fill the earth with gentle manners. It is both feasible and rational, and should appeal to and be practised and advocated by all who seek the ideal life and aim at producing a sweet-tempered, intellectual, and artistic, yet vigorous, active, and prolific race."

COMPARATIVE TABLE

OF

ALIMENTARY PROPORTIONS




Albumin
Fats
Carbo-
hydrates
Ash
Water
Beef
Barley
Oats
Rice
Maize
Rye
Buckwheat
Wheat
Bread
Macaroni
Lentils
White beans
Dried peas
Potatoes
Cabbages
Onions
Carrots
Turnips
Cress
Spinach
Tomatoes
Mushrooms
Apricots
Cherries
Lemons
Quinces
Strawberries
Oranges
Peaches
Apples
Pears
Plums
Grapes
Bananas
Dates
Figs (dry)
Almonds (dry)
Hazlenuts
Walnuts (dry)

GLOSSARY

DEFINITIONS OF TECHNICAL TERMS

Acetonuria—The presence of acetones in the urine.
Acne—Inflammation of the sebaceous glands.
Adynamia—Deficiency or loss of vital or muscular power.
Albumin—A proteid substance, the chief constituent of the body.
Albuminoids—Substances resembling true proteids in their origin and composition.
Albuminuria—The presence of albumin in the urine.
Albumose—A substance formed from albuminoids during digestion.
Alkaloid—Resembling an alkali.
Amid—A chemical compound produced by the substitution of an acid radical for one of the hydrogen atones of ammonia.
Amin—From ammonia.
Amydin—Soluble starch.
Amylolitic—Pertaining to or effecting the digestion of starch.
Anabolism—The process of changing food into constructive tissue.
Anorexia—Absence or diminution of appetite.
Antitoxic—Counteracting poison.
Aortitis—Inflammation of the aorta.
Aplastic—Structureless; not able to form tissue.
Arthritis—Inflammation of a joint.
Assimilation—The process of transforming and absorbing food in the organism.
Asthenia—General loss or absence of strength.
Asystole—Imperfection of the heart's action.
Atheroma—Tumor.
Atonia—Want of tone; debility.
Atrophy—A deterioration of parts originally normal.
Azoturia—Increase of urea and urates in the urine.

Blennorrhagia—An excessive catarrhal discharge from the urethra or vagina.

Cachexia—Depraved condition of nutrition.
Calory—A heat unit.
Carbohydrate—An organic substance containing oxygen and hydrogen in the proportion in which they form water.
Cardiopathy—Any disease of the heart.
Casein—A derived albumin.
Catabolism—Destructive action of the organism. (See Disassimilation.)
Cecal—Relating to the cecum.
Cecum—The large blind pouch in which the large intestine begins.
Cellulose—The primary substance of organic cell-walls.
Chlorin—A non-metallic element.
Chlorosis—The "Green Sickness."
Cirrhosis—Increase and thickening of the connective tissue of an organ, especially of the liver.
Coefficient—An agent that unites its action with that of another agent for the procuring of a certain result.
Colitis—Inflammation of the colon.
Collagen—A substance existing in various tissues of the body.
Coma—Abnormally deep and prolonged sleep, with the functions of the brain in abeyance.
Combustion—The burning up of food by bodily heat in the organism.
Creatin—A neutral organic substance that occurs in the animal organism, especially in the juice of the muscles.
Cystin—A substance found in the urine in small amount.
Cystitis—Inflammation of the bladder.

Depuration—Cleaning.
Dextrin—The soluble or gummy matter into which starch is converted by diastase or by certain acids.
Diabetes—The sugar disease.
Diaphoretic—Sudorific; producing sweat.
Diastase—A nitrogenous vegetable ferment.
Diathetic—Liable to certain diseases.
Dietetics—The science of systematic regulation of the diet for hygienic and therapeutic purposes.

Disassimilation—Decomposition and rejection of undigested food substances. Non-absorption.
Diuresis—Abnormal increase in the secretion of urine.
Dulcite—An hexahydric alcohol.
Dyspnea—Difficult or labored breathing due to disease.

Endogenetic—Due to internal causes.
Enteritis—Inflammation of the small intestine.
Enterocolitis—Inflammation of the small intestine and of the colon.
Enteroptosis—Relaxation of the abdominal viscera.
Epithelium—The cuticle of a mucous surface and of the skin.
Etiology—Causes of diseases.
Euphoria—The feeling of well-being or health.
Exogenetic—Due to external causes.
Extractives—Substances extracted from various animal tissues.

Fecula—The starchy part of a seed.
Ferruginous—Containing iron.
Flora—Plant life.

Galactose—Lactose.
Gasterectasis—Dilatation of the stomach.
Gastritis—Inflammation of the coating of the stomach.
Glucose—Grape-sugar, starch-sugar.
Gluten—A substance resembling albumin.
Glycogen—Animal starch.
Glycosuria—The presence of grape-sugar in the urine.

Hemoptysis—The spitting of blood.
Humoral—Pertaining to the natural fluids of the body.
Hydration—The impregnation of a substance with water.
Hyperchlorhydria—Excess of hydrochloric acid in the gastric secretion.
Hypertension—Abnormally high tension. Same as supertension.
Hypertrophic—Marked by excessive size.
Hypopepsia—Disorder of digestion.
Hypostenia—Weakness.
Hyposystole—Deficiency of cardiac systole.
Hypotension—Abnormally low tension. Lowered or diminished tension.

Icterus—Jaundice.
Ingestion—The partaking of food.
Inosite—A saccharine substance in the human body.
Inulin—A vegetable principle.
Invertin—A ferment found in the intestinal juice.
Isodynamic—Having equal force.

Lactose—Milk-sugar.
Lecithin—A complex nitrogenous fatty substance present throughout the animal body.
Leucin—A product of pancreatic digestion.
Leukomain—Nitrogenous bases or alkaloids developed by our vital functions.
Levulose—The natural sugar of fruits.
Lithiasis—The formation of calculi (stone).

Malate—A salt of malic acid (found in unripe apples, grapes, etc.).
Maltose—A variety of sugar found in beer.
Mannite—The exudation of the flowering ash.
Metabolism—The natural changes constantly taking place in the cells of the human body.
Myocarditis—Inflammation of the muscular tissue of the heart.
Myosin—The chief proteid of the muscle.

Nephritis—Inflammation of the kidneys.
Neurasthenia—Nervous affections.
Nuclein—A substance that occurs in the nuclei of the cells.

Olein—A natural fat.
Oliguria—Diminution of urine.
Oxaluria—Presence of calcium in the urine in undue proportions.

Pancreatin—The active elements of the juice of the pancreas.
Parenchyma—Soft cellular tissue.
Pathogenic—Producing disease.
Pathological—Abnormal, diseased conditions of the body.
Peptone—A proteid body produced by the action of digestion.
Periosteum—A fibrous membrane that invests the surfaces of the bones.

Peristalsis—The peculiar movements of the intestines which propel the contents onward.
Physiological—Pertaining to the natural or normal processes of the healthy body.
Proteids—A general term for the albumin and albuminoid constituents of the organism.
Psoriasis—An inflammatory disease of the skin.
Psychic—Pertaining to the mind or sential principles.
Ptomains—Inanimate poisonous substances resulting from putrefaction of albuminous substances.
Ptosis—Drooping.
Puric—Belonging to purins.
Purins—Unclean or poisonous substances, foreign to our alimentary organism.
Pylorus—The opening of the stomach into the duodenum.
Pyrexia—Fever

Saccharose—Cane-sugar.
Sclerosis—Overgrowth of the connective-tissue of an organ.
Silica—The oxid of silicon.
Solanin—A glucosid.
Stasis—A condition of standstill.
Steapsin—A diastasic ferment.
Stenosis—Constriction or narrowing of any part.
Stomatitis—Inflammation of the mouth.
Supertension—See hypertension.

Ternary bodies—The fats, albumins, and carbohydrates of any food.
Therapeutics—The application of remedies as a means of cure.
Toxic—Poisonous.
Tyrosin—A decomposition product of proteids.

Urea—The chief solid constituent of the urine.
Uremia—Retention in the blood of excrementitious substances normally excreted by the urine.
Uropoieses—The neutralization of toxic matter.

Xanthic—Pertaining to xanthin—yellowish.
Xanthin—A leukomain found in nearly all the tissues and liquids of our economy—yellow coloring matter.

ANALYTICAL TABLE OF DISEASES

Note.—This table contains only a list of the *principal* diseases referred to in the book, indicating the number of page on which the diet affecting the disease is mentioned.

APPROXIMATE EQUIVALENTS OF METRIC WEIGHTS AND MEASURES

One gram is equal to about fifteen grains.

One kilogram is a little more than two pounds.

One c.c., or one cubic centimeter, is equal to 16.9 minims or drops.

3.54 cubic centimeters = one fluid drachm

28.35 cubic centimeters = one fluid ounce.

567 cubic centimeters = one pint.

4536 c.c. = 4.536 liters = one gallon.

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